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FOCUS ON JAPAN

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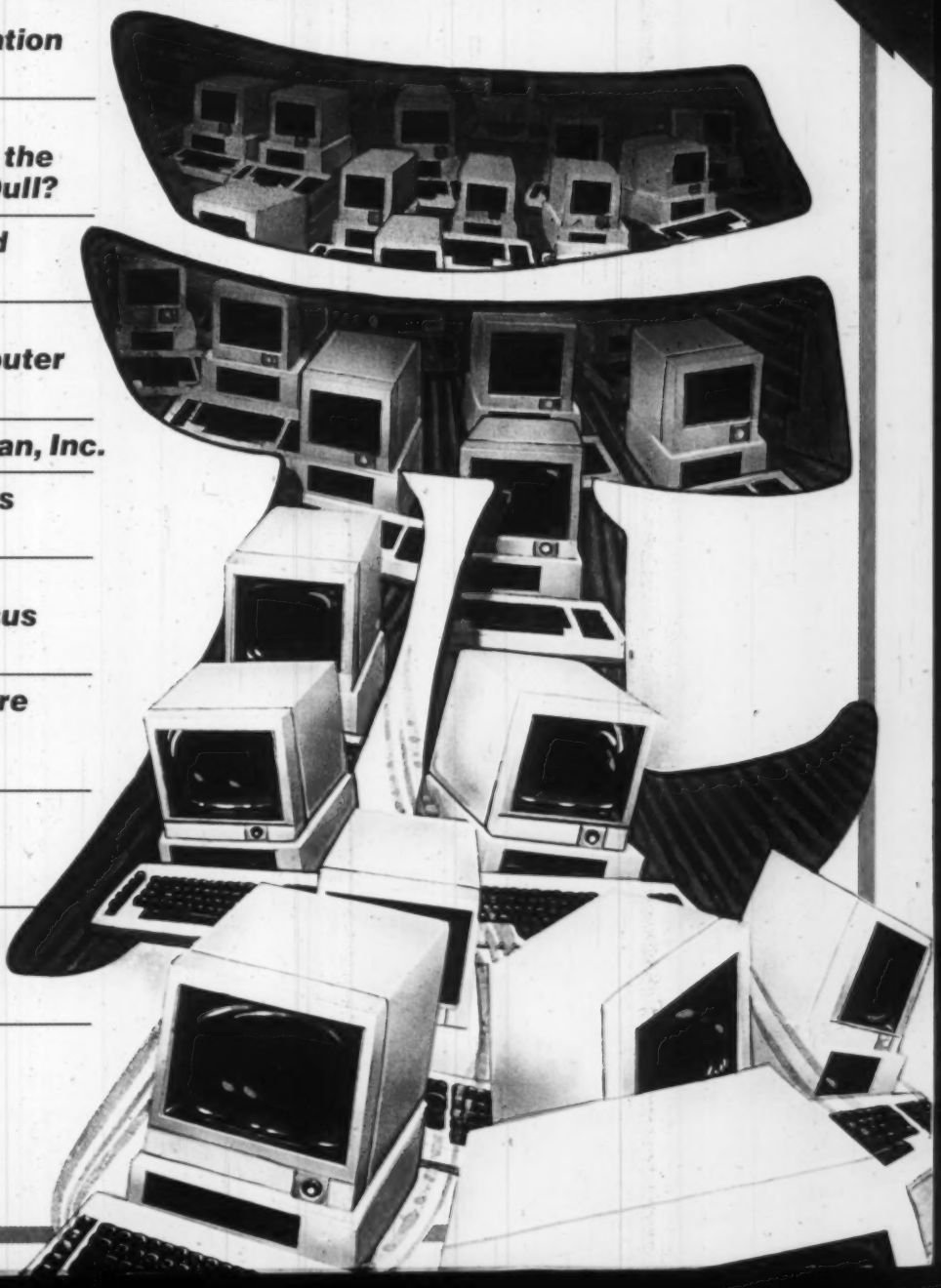

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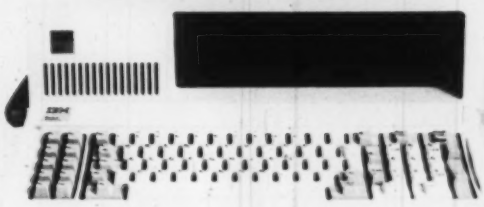

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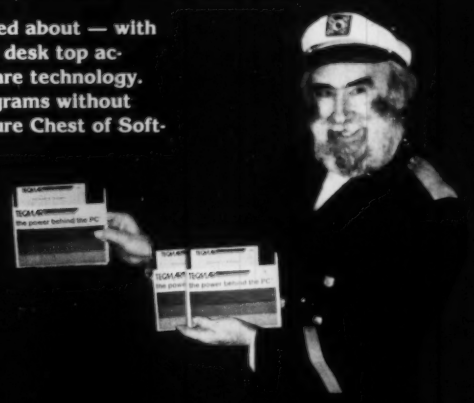

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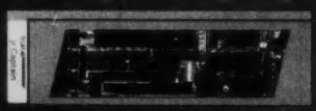

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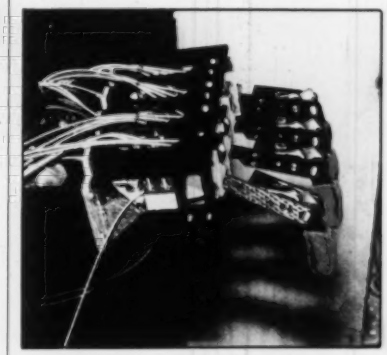

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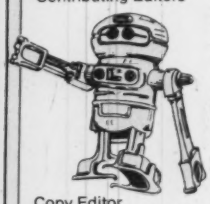

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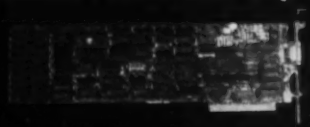

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CIRCLE 179 ON READER SERVICE CARD

Input/Output

Bank Street Righter

Dear Editor:

I write this letter to raise, as an issue of fairness, our concerns with your magazine's review of the IBM PC version of the *Bank Street Writer* (IBM Images, May, 1984).

The author has reviewed the program as a "professional writer." It is therefore understandable that she did not judge the product from the perspective that the *Writer* was developed: an easy to use tool for beginners. Had the *Bank Street Writer* been marketed as a word processor for the office or a full featured program designed for professional use, the review would have been more reasonable in reservations it expressed (although not in its inaccuracies).

The reviewer states that "there appears to be no way to reform text after you have diddled with it." This is simply not the case. The *Bank Street Writer* certainly does reform text after corrections, but it does it in a subtle way that has been designed to not interfere with writing and not require memorizing another command. First, the *Writer* automatically reforms the text as small corrections are made (inserting less than a line, etc.). Second, for larger corrections, the *Writer* waits until after the correction has been made and until the user moves the cursor away from the spot where the changes were made. As soon as the cursor is moved, the text reforms. Finally, for larger changes that would cause large amounts of screen redrawing, the *Writer* reforms the text when the user presses ESC to enable the function menu (in other words, when he goes on to do something else).

Finally, let me enumerate some errors of fact in the review:

The reviewer states that "the documentation is mum about system requirements." This is not true. There is a list of requirements on the package, a complete discussion of requirements in the first section of the manual and even an appendix on the uses of different versions of DOS and the resulting memory requirements.

The reviewer states that "the documentation is not very good" and yet the only statement beyond that is that the manual doesn't lie flat. Surely this is not *Creative's* review criterion for documentation. The manual is, at least in our judgment, quite literate and complete, providing an excellent and thoughtful introduction to word processing for beginners. It is true that it is saddle-stitched and not spiral-bound, but it is thin enough to still lie flat!

Lastly, we were dismayed to see a screen picture accompanying the review that was not the IBM PC version of the *Bank Street Writer*. It is of an older, Apple version, a 40-column version that looks little like the program that is the subject of the review.

In summary, the *Bank Street Writer* makes no claim to be an advanced tool for the already accomplished writer. As the dozens of reviews about it in the last year have pointed out, it is a tool for the novice or occasional writer, a word processor that adults and kids in a family can share. It is therefore appropriate that it be reviewed in that context.

The author states "I found this word processor immensely tiresome, but I think kids and beginners will enjoy its simplicity and ease of use." Exactly!

Richard R. Ruopp, President
Bank Street College of Education
610 W. 112th St.
New York, NY 10025

Notices

A Note To Readers

As you glance through this issue, you will notice that the regular columns and sections are absent. This is temporary—for this issue only—and they will all reappear in September. Indeed, we have some fascinating issues planned for the remainder of 1984, as well as into 1985. For a preview, see the Coming Attractions section on page 216.

Off by a Factor of 10

Our chart of electronic spreadsheets in the June issue listed the price of *Multiplan* for the Commodore 64 from HesWare as $10. Most of our clever readers have undoubtedly already deduced that that price was too good to be true, but HesWare's *Multiplan* is still a bargain at $99.95.

Turbo Pascal

In our review of Turbo Pascal in the July issue, our biggest criticism was the lack of graphics. Borland International has since announced version 2.0 with full graphics, color, and sound support for the IBM PC and PCjr. It also has windowing, automatic overlays, and optional support for the 8087 chip.

The Graphics Solution for Apple Owners

In the chart of graphics packages (July, page S-9), we incorrectly said *The Graphics Solution* runs on an IBM PC. Our mistake; as mentioned in the text, this excellent graphics package from Accent Software, Inc. runs on an Apple II.

Appleworks Credit Where Credit is Due

In our review of Appleworks in June, the byline should have gone to Neil Shapiro, whose original review appeared on the Micronet Apple Users Group section of the Compuserve Information Services network. The name that appeared on the review was of our former associate editor, Steve Arrants.

Juki 6100 Printer Documentation

In our review of the Juki 6100 printer in May, we remarked that new documentation was on the way. Well, we got it and it is superb. It consists of a 164-page, fully indexed, spiral-bound manual with sections on unpacking, interfacing (separate sections for Apple, IBM, Kaypro, Osborne, TRS-80, and generic), special codes, maintenance, and attachments. Outstanding!

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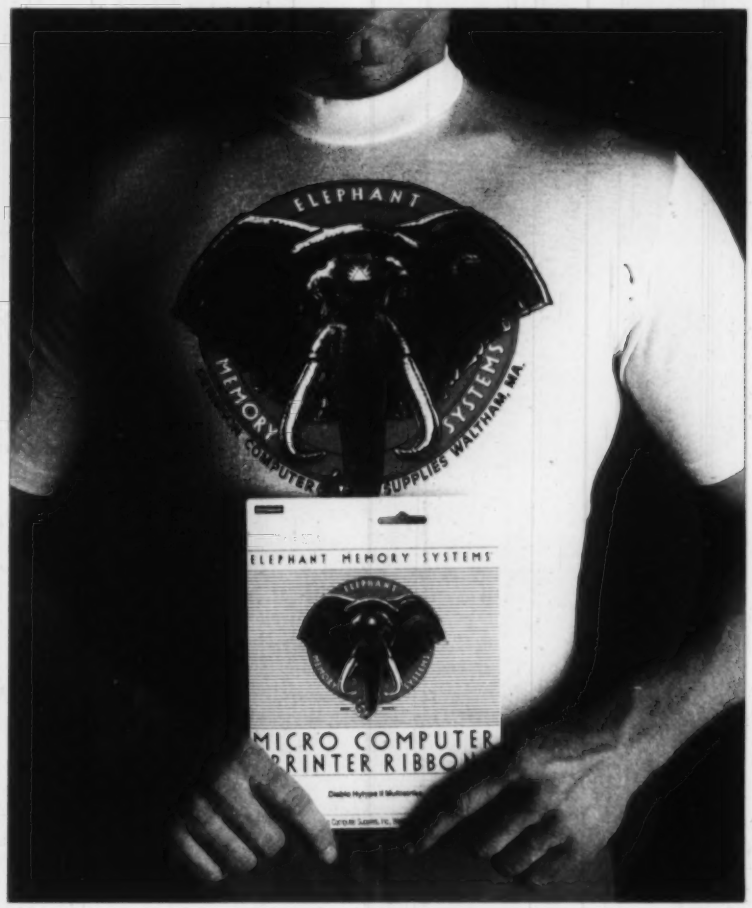

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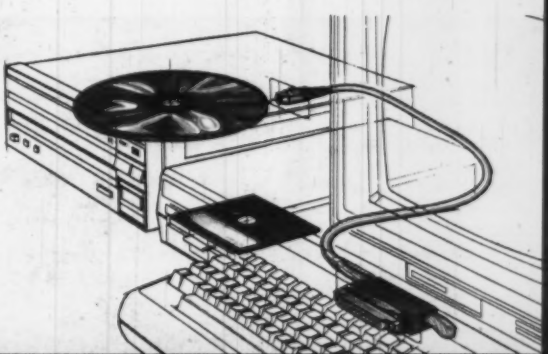

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Why Do An Issue About Japan?

Engineers, Lawyers, Managers, Investors—and Computers

なぜ日本の特集号を

David H. Ahl

Lawyers fight about how to cut up the pie, while engineers focus on how to make the pie bigger and better. That, I believe, is the essential difference between the American and Japanese societies.

The U.S. has roughly twice the population of Japan but annually graduates three times as many lawyers. We are a nation of laws and legislation and litigation. Who benefits from this? Mainly the lawyers. There are few professions that contribute less to the quality of life and economic well being of the nation than lawyers.

On the other hand, Japan, with half our population—packed, incidentally, into an area about the size of Montana—graduates twice as many engineers as does the U.S. Thus, on a per capita basis, there are four times as many engineers in Japan as in the U.S. As a result, far more people in business, education, and government have a technological background.

The result of this—and many other factors—is a central focus in Japan on economic independence (a bigger pie) through technological supremacy (a better pie). Fifty years from now in the U.S., we will still be arguing about how to cut it up.

"They'll Never Catch Us"

When I first heard about MSX at the end of last year, I thought we probably should do a piece about it and, because many of the MSX manufacturers were unfamiliar names in the computer field, something about those companies as well. However, as I started looking into the Japanese computer industry and several specific companies, it became apparent that there was a much larger story to be told.

Interestingly, most of the people with whom I spoke about Japan seemed to be at one of two poles. The smaller of the two groups waved yellow flags with the slogan, "The Japanese are coming!" "Look what happened in steel and automobiles and hi-fi and TV sets and VCR's," they chanted. "Next it will be computers."

In the other camp were the entrepreneurs in Silicon Valley who said, "The Japanese don't have a chance. We're not like the stodgy executives in Pittsburgh and Detroit. We're running so fast, they'll never catch up." This view is reinforced by the software we have seen from Japan—mostly games—and the seeming inability of the Japanese to produce business-oriented packages in a timely manner.

What is the real situation? The easy answer is that it lies somewhere between these two extremes. Sure, but where? In the middle, 60-40, close to one end, or what? I must confess that when I started on this issue, I leaned to the Silicon Valley end; I felt the "yellow peril" people were being just a bit alarmist.

Now, six months later, after talking to scores of Japanese executives, researchers, and government officials, as well as U.S. experts on Japan, advanced computers, and public policy, I have shifted by position quite dramatically in the other direction.

On the other hand, my position is certainly not the only one; indeed, it may not be the correct one. Hence, I have attempted to gather in this issue the widest possible range of views. As you read the articles, you will be startled to find the same facts leading to entirely different conclusions.

Several of the authors are quite upset with me for doing this. One said, "I don't want to appear in the same magazine with X. He's a fraud." A Japanese writer commenting about an American said, "Sure, he's spent time in Japan, but he doesn't really understand the Japanese mentality."

The Japanese Mentality

That last comment is probably quite true. Few Americans truly understand the Japanese mentality. I made a chart of some outward features of Japanese people compared to Americans. Yes, my rankings are somewhat subjective and you can probably find fault with them. Nevertheless, the chart shows some significant differences.

First, the Japanese seem to be people of extremes; no middle-of-the-road people these. Fanatic might be a better word. We may fault them for not being more individualistic or not granting equal opportunity to women (minorities are not an issue—there are none in Japan—blacks, whites, and even other orientals are not welcome in Japan, ex-

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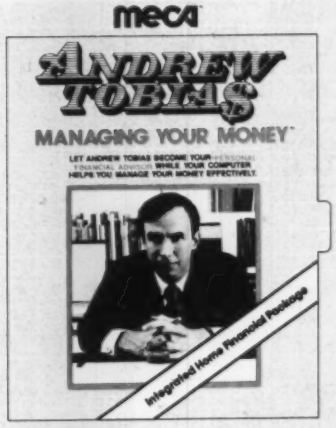
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cept on a temporary basis).

On the other hand, when they set their collective mind on a goal, there is no stopping them. They are dedicated. They cooperate with each other—people, companies, all elements of society—far beyond anything known in the Western world. They are perfectionists—with an element of pragmatism. And they are infinitely patient, but tenaciously persistent.

Characteristic	Japan	U.S.
Willing to take risks	−−	+++
Act as individuals	−−−	++
Equality of sexes and races	−−−	++
Intelligence (IQ)	++	−
Pragmatism	+++	+
Dedication	+++	+
Perfectionism	+++	−
Cooperation	+++	−
Politeness	+++	−
Respect for authority	+++	−−
Loyalty to company/country	+++	−−
Decision by consensus	+++	−−

Will It Work in the Computer Market?

But, say the detractors, computers aren't the same as steel, ships, cameras, motorcycles, automobiles, TV sets, hi-fi systems, and VCRs. Computers are an intellectual tool. Maybe the Japanese can build good hardware but it will be outdated long before they can write any software. And furthermore, their marketing stinks.

To most people—consumers and business managers alike—computers are a mystery. Typical Japanese documentation and marketing will do nothing to dispel the idea that computers are incomprehensible. In this market, assigning more and more people to perfect the hardware is not what is needed.

These arguments sound persuasive, but they miss the fundamental issue. The reason the Japanese haven't been a major force in computers is that they haven't targeted the computer market, at least not until recently. In other words, they haven't even tried.

I said the Japanese were a patient people. They focus on long-term goals, not short-term ones. After World War II, Japanese planners focused on 50 years, not two or three. First, was the requirement to generate cash flow but much of their industrial capacity was lying in ruins so they turned to products that could be made with a dispersed labor force—textiles and crafts. Next, they focused on basic industries—steel, shipbuilding, and energy. Having established these industries in the 60's, in the 70's they turned to automobiles, cameras, consumer electronics, instruments, and industrial robots.

Is there any question that the Japanese have been successful in these industries? Not by dumping, not by trade barriers, not by currency manipulations, not by substandard wages, but by producing high quality products at a competitive price. Now, in the decade of the 80's, Japan is focusing on semiconductors, computers, software, fiber optics, and other high technology industries.

In 1950, American textile companies said the Japanese makers couldn't succeed in the U.S.; in 1960 steel companies said the same thing; in 1970, automakers echoed these same words; and today we are hearing them again from the computer companies. It sounds like a broken record. The funny thing is, the ending is always the same.

Many Americans say, "but this time it's different," and we hear the familiar words about software and marketing. Well, it's different for some other reasons, too. There are more American computer companies in bed with the Japanese than there ever were in any other industry—Amdahl (Fujitsu), National Semi (Hitachi), and scores of others who rely upon Japanese components and parts.

Make no mistake about it, we are engaged in a full-scale economic war. Moreover, it has escalated to the point where Japanese companies are merging with and taking over American companies. Since the 1920's, the American stake in Japan had always been far higher than Japanese investments in American companies. But in 1981, the turning point came. Today, Japan's $10.5 billion stake in American business puts it way ahead of the $8 billion that Americans have invested in Japan.

So you don't like it. Too bad. Commenting on the situation, a Japanese businessman recently said, "It is necessary and inevitable that American business accept the changes graciously." Well, maybe. Regardless of whether the changes are brought about by the Japanese or by other forces, they will occur, and the Japanese will play an important role. It is with this in mind that I gathered together the wide range of authors and articles in this issue of *Creative Computing*.

Cooperation or competition, friend or foe, moving together or moving apart? These and many other questions are posed in this issue. There are some answers suggested, but the real answers must come from you, the readers. 完

Quiz

1. Who is the largest computer manufacturer in Japan (total sales)?
2. Who is the largest Japanese seller of desktop computers?
3. Who is the largest foreign seller of small (personal) computers in the U.S.?
4. Who is the largest Japanese electronics company?
5. Who is the largest producer of 35mm SLR cameras in the world?
6. Who is the maker of the fastest commercial supercomputer in the world?
7. Who makes the Sperry Univac desktop computer?
8. Who is the leading maker of pocket calculators in the world?
9. What states, if any, have a population density exceeding that of Japan?
10. The director of the Fifth Generation Project expects its technology will have the greatest impact on what size computers?
11. What is the "normal" level of unemployment in Japan?
12. True or false: Women college graduates in Japan have the same employment opportunities as do men.
13. The Japanese standard of living is (lower than, the same as, higher than) that of the U.S.
14. Who is the world's largest manufacturer of 64K RAMs?

Please turn to page 38 for the answers.

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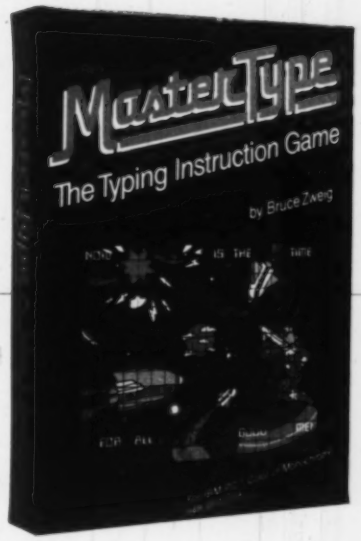

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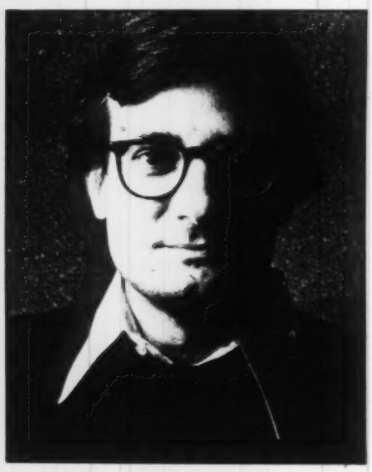
Winning Isn't Everything... Or Is It?

勝つことがすべてではない
否それがすべてか

Steven Schlossstein

"We don't want to copy IBM, we want to beat them."
—T. Ishihara, Managing Director
Japan Software Industry Association



Steven Schlossstein, a native Texan, studied and worked in Japan for more than six years. In 1982, he resigned as a vice president of Morgan Guaranty Trust Company of New York to establish his own financial consulting firm. He is the author of Kensei, a novel of computer chip rivalry between America and Japan, and most recently of Trade War, subtitled "Greed, Power, and Industrial Policy on Opposite Sides of the Pacific." Mr. Schlossstein now lives in Princeton, NJ, dividing his time between Tokyo and New York.

Fukoku Kyohei was the rallying cry of Meiji Japan when that isolated island country broke out of its self-imposed cultural cocoon in 1868 to embark upon a comprehensive plan of modernization to catch up with the Western world.

"Rich Country, Strong Army" is literally what the phrase meant. Figuratively, however, it represented Japan's first experimentation with a concept called industrial policy: concentrating on the development of *strategic* industries—strategic whether because of their connection with military defense or because of their importance in export industries intended to compete with, and win against, the foreigners. Japan had to apprentice herself to the West for a while before she succeeded, but the primary motivation stemmed not from a desire to imitate the West, but to better it.

The military results, of course, were impressive. Japan defeated China in 1895, blew Russia out of the water in 1905, annexed Korea and Taiwan in 1911, took over Manchuria in 1931, and sat atop the Greater East Asia Co-Prosperity Sphere by 1940. All this from a country previously regarded as barbarian by the rest of the world.

The economic results were no less impressive. Japan quickly became the world's largest shipbuilder, soon replaced England as the world's leading textile manufacturer, and then knocked off Germany as the premier producer of heavy industrial machinery and equipment. All this from a country previously regarded as barbarian by the rest of the world.

The postwar economic miracle came next, based on the same process of strategy formulation, and you know what happened. Japan is now the world's No. 1 automaker, produces more steel than anyone else, manufactures over half the TV sets in the world, is the *only* meaningful producer of VCRs, dominates the 64K RAM computer chip sector, and leads the way in the branch of advanced computer technology known as artificial intelligence (AI). And all *this* from a country previously regarded as barbarian by the rest of the world.

Industrial Policy Sangyo Seisaku

Well, we all know the myths. Japan's economic success today is due to (1) cheap wages and inhuman living conditions of its workers (they are economic animals who live in rabbit hutches), (2) "unfair" trade practices, such as predatory dumping and export drives, (3) that insidious collusion between government and industry known as Japan, Inc., (4) restrictive administrative practices or invisible non-tariff barriers, and (5) a "closed" domestic market, in which foreigners find it easier to read *kanji* than to sell their wares.

But the foundation for Japan's modern economic success was laid by the Meiji oligarchs more than a hundred years ago. They have spent the past century honing, sharpening, polishing,

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refining. The past *century.* We know this because we have done a little reading and a little study. But our commercial policymakers in Washington act as though they believe Japan's modern economic success is based entirely on these myths.

Professor Herbert Norman of Canada was the first modern scholar to look critically at Japan's feudal age in terms of political exploitation, autocracy, and economic imbalance. He brought to light that unique feature of Japanese industrialization: monopolistic and state control of the nation's strategic industries.

This policy of developing strategic industries had unfortunate consequences for the rest of the world. Because the emphasis on military defense as one strategic industry meant that by 1945, Japan had engaged in foreign military adventures and war in every decade of its modern era with the exception of the 1880s. And the emphasis on exports as the other strategic industry meant that Japan had engaged in competitive foreign trade—economic warfare—in every decade of its modern era *including* the 1880s.

Simply put, it's called Industrial Policy.

"An indigenous Japanese term not to be found in the lexicon of Western economic terminology," Robert Ozaki wrote in *Japanese Views on Industrial Organization* in 1970. "It refers to a complex of those policies concerning protection of domestic industries, development of strategic industries, and adjustment of the economic structure in response to or in anticipation of internal and external changes which are formulated and pursued by MITI in the cause of the national interest."

MITI

Well, you knew it wouldn't take us long to get around to MITI—Japan's Ministry of International Trade and Industry. MITI has been instrumental in the orchestration and implementation of Industrial Policy in Japan. But not just since the war. Since Meiji.

It split off from the old Ministry of Agriculture and Commerce in 1925 at a time when economic conditions were changing throughout the world. The volume of foreign trade was beginning to shrink, protectionist walls sprang up in virtually every country including the United States (remember Smoot-Hawley?), and the tectonic plates of the Great Depression had just begun to shift.

Bureaucrats in the new Ministry of Commerce and Industry, MITI's predecessor, took a hard look at what was going on. One of the new bureaucrats, a man named Yoshino Shinji, discovered that despite the huge power of Japan's *zaibatsu,* it was the small and medium-sized enterprises that accounted for the lion's share of jobs in the economy. He also found that the *zaibatsu* produced principally for the domestic market, while the smaller firms were the country's major exporters.

Yoshino and his colleagues set up within MCI a Commerce and Industry Deliberation Council to bring everybody together to discuss all these negative things that were happening to the economy. Everybody. Not just the big boys, but the little fellows, too, along with representatives from labor, academia, other branches of national government such as the Ministry of Home Affairs and the Ministry of Finance, local government, trade associations, exporters, importers, the manufacturing sector, the service sector, consumers, the news media, everybody.

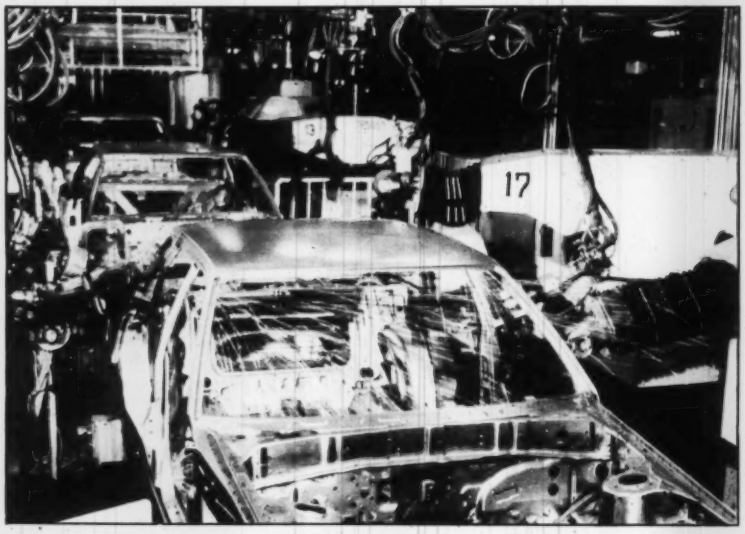
Yoshino, who later became vice minister of MCI because of his successes with Industrial Rationalization, singled out the German industrial model from among all the foreign systems he had studied at the time. "German industrial rationalization," he noted, "was devoted to technological innovation in industries, to the installation of the most up-to-date machines and equipment, and to generally increasing efficiency." It also used government trusts and organized cartels.

He began to see that excessive competition ought to be replaced by cooperation, *and that the purpose of business activities should be the attempt to lower costs, not make profits.*

"Modern industries attained their present development primarily through free competition," Yoshino once said. "However, various evils of the capitalist order are gradually becoming apparent. Holding to absolute freedom will not rescue the industrial world from its present disturbances. Industry needs both a plan of comprehensive development *and* a measure of control. Concerning the idea of control, there are many complex explanations of it in terms of logical principles, but all one really needs to understand it is common sense."

(Control is endemic to the Japanese. When China began to split apart in the late nineteenth century, the old Tokugawa leaders watched what was going on and didn't want that to happen to Japan. The Europeans were slicing up the Central Kingdom like Sara Lee coffee cake, and all the Chinese were getting was the tinfoil wrapper. We won't keep the Westerners out, the Japanese reasoned. We'll just *control* them. Which they have been doing ever since.)

So what this whole process did was to



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give Japan a head start down the learning curve. By replacing excessive competition with a form of self-control in industry. By finding a better criterion for corporate performance than short-term profitability. By attempting to gain a more competitive edge through effective cost cutting and economies of scale.

And the people who converted MCI to the wartime Ministry of Munitions to the postwar Ministry of International Trade and Industry were the *same people* who had guided Japan's industrial policy throughout the entire prewar era. All of MITI's vice ministers during the 1950s had entered the Ministry between 1929 and 1934. The civilian bureaucracy was characterized by nothing if not by continuity, and that continuity translated itself into a rampant economic nationalism.

Tactical Tools

As you can imagine, MITI does not accept the conventional wisdom that market forces alone will create the desired effect. So it helps the market along, and it has several tactical tools in its kit which it has made, borrowed, or copied for this purpose. These policy tools are *protective, developmenta', and interventionist* in nature. Like the playbook of a professional football team: defense, special teams, and offense.

When MITI's defense takes the field, it protects—infant industry sectors, mostly—by imposing tariffs, import controls, preferential taxes, foreign exchange controls, and limits on foreign investment in those sectors.

The special teams emphasize development, or what MITI calls "nurturing," of special situations. This is accomplished through low-interest loans to targeted industries, subsidies, special depreciation measures, research and development funding, cartels, and foreign technology licensing.

When the offense takes over, MITI intervenes using a stick and carrot approach: withholding approvals in cases where client companies are obstinate, licensing plant and equipment investment for strategic industries, rewarding cooperative companies by making government funds available, all by authority of its broad charter under the enabling legislation or by means of its unique administrative guidance, a kind of jawboning, Japanese-style.

MITI's career bureaucrats are the government elite. *MITI and the Ministry of Finance each recruit more graduates from Tokyo University every year than any other Ministry.* It is as though the Dallas Cowboys and the Pittsburgh Steelers got the top draft choices, year after year after year.

MITI will use anything and everything as tactical tools to support their industrial policy. Because it is in the national interest. MITI says, in effect, "Hell, we can't make ICBMs, so we might as well cut loose on industrial policy."

Value-Added

International comparative advantage. Highly competitive manufacturing sector. Higher value-added, higher-productivity businesses. Deliberate restructuring of industry. Aggressive export strategies.

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In the early 1950s, nearly a third of Japan's exports still consisted of fibers and textiles. Another 20 percent was "sundries," and only 14 percent was machinery and equipment.

By the mid-1960s, however, machinery and equipment was the leading category of Japanese exports, accounting for nearly 40 percent. Next were metals (steel) and metal products, with 26 percent. Fibers and textiles had dropped to less than ten percent.

It is as though every other country in the world was pursuing an industrial strategy based on the old football philosophy of Woody Hayes: three yards and a cloud of dust.

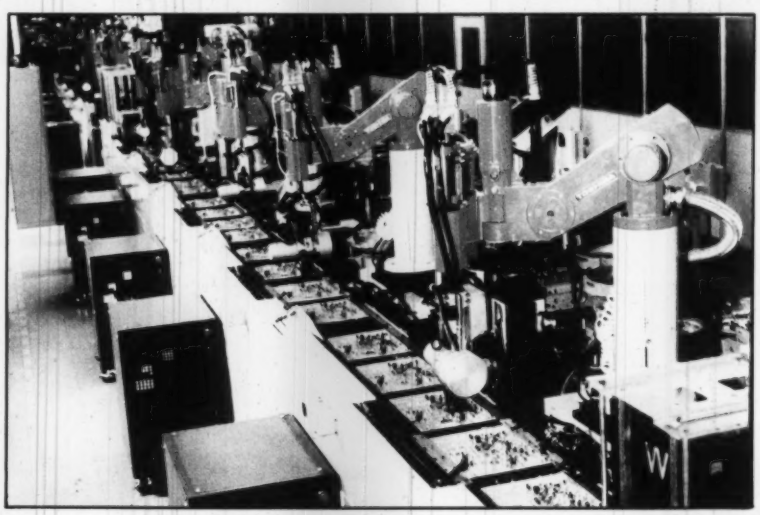
Then along comes this strange team that doesn't *run* with the ball, they *throw* it. Everybody laughs at first. Nobody understands. Until they see how many points this new team scores. This, of course, leads to much yelling about how unfair it is for them to throw the ball, and how the rules ought to be changed. Or else, God forbid, this inequitable balance will be perpetuated.

All because America and others never understood the concept of industrial policy.

Between 1960 and 1980, for example, machinery as a percent of Japan's total exports to the U.S. increased from 17 percent to 68 percent, while textiles and fibers fell from 26 percent to three percent. But the *structure* of American exports to Japan remained relatively unchanged: raw materials (grain, coal, ore) and fuels from eight percent to 20 percent, and manufactures from 33 percent to 37 percent.

Plus ça Change

Well, it all boils down to choice. The Japanese, through discipline and not a little self-denial, have chosen industrial policy and a conscious strategy of higher



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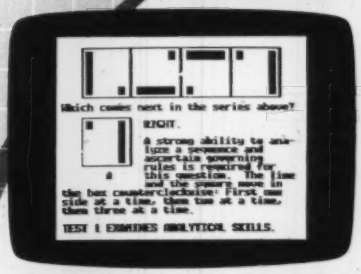

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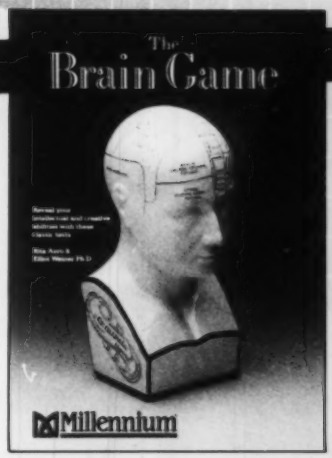

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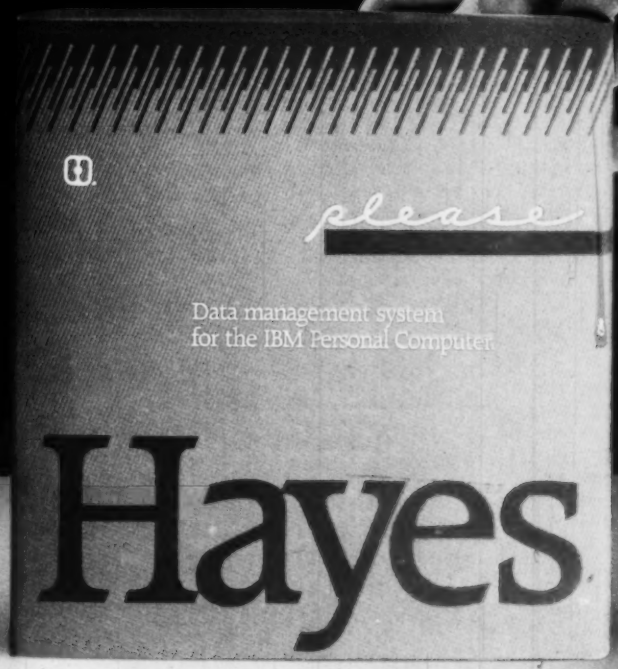
Please."



"Put it here, Please."
Design a special screen format to position data in a particular place.

knowing all that storage power is there? Just in case you ever need it?

Now you might think that a data management system that does all this must be difficult to use. Right? Rest assured. *Please* works hard so you don't have to. An easy-to-follow sample disk shows you everything you need to know to create your first database. Three *Please* menus show you which keys to press to access every feature. And whenever you need it, *Please* provides on-screen HELP messages, tailored to a specific task. So you needn't waste time reading through a list of unrelated instructions on your screen. Or stop what you're doing to consult a manual. In no time at all, and with no assistance at all, you'll be a *Please* database pro!

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value-added sectoral development that has vaulted them into global preeminence in manufactured goods exports, national industrial strength, and product quality. As Alexandre Dumas the Elder would say, Nothing succeeds like success.

We hairy barbarians, as they call us, through evaporation of our work ethic and an addiction to self-fulfillment, have chosen a philosophy of *qué será será*, embracing those free market forces, which has made us number one in fast foods, soybeans, and Minuteman missiles, but has eroded our industrial base. Or, as Rudyard Kipling wrote in "The Lesson," we have forty million reasons for failure but not a single excuse.

Conscious choice.

A Hudson Institute report summed it up for the pessimists. "If the Japanese prefer to maintain a higher rate of economic growth for a longer period of time, and to seek this goal through policies that maintain a higher level of investment than other advanced industrial countries—and if the Japanese follow this course in the full knowledge that they live less well in the short term than their counterparts elsewhere—there is little that other governments can do to compensate for any international trade effects created by this choice."

One of my Japanese friends was more succinct.

"You want to know the real reason we'll prevail in the long run?" he asked me one day over a little raw fish and sake.

I nodded.

"We don't believe in God."

It was true. The Japanese have no religious rites on Sunday, or professional football either, to distract them from their national economic priorities. And sumo wrestling, that national sport which pits those massive wrestlers against each other with such intense competitive rivalry, is almost imbued with a patriotic pride of the sort we feel only when we hear our National Anthem. Neither do the Japanese have any meaningless mottos about God on their currency. Their lives seem to be caught up in a contemporary version of economic nationalism, a kind of common purpose and drive we understand only when we are fighting military wars and exhorting Rosie the Riveter to hammer 'em in for democracy.

It is uncomfortable to watch our relative standard of living decline. We may still have the highest absolute standard of living in the world, as measured by the number of swimming pools or the percentage of homes with central air conditioning or our per capita income, but how does that translate into a *relative* standard that says our cars are inferior, our steel is priced out of the market, and nobody wants to buy our machine tools anymore?

Which says there is a basic irony in the two philosophical approaches, East and West.

The Japanese have a fundamental position of respect for nature. They are non-interventionists. They see nature as something to be admired and respected. They approach it with a spirit of humility. They want to exist in *harmony* with it. But when it comes to markets, which are man-made to begin with, they have an equally fundamental understanding that markets are imperfect, and that intervention may sometimes be necessary to keep them moving in the desired direction.

If the Japanese had taken the same position with respect to markets that they take with nature, they would still be exporting Christmas tree ornaments, dollar blouses, and cheap toys.

We Americans have a fundamental position of disregard for nature. We are basically interventionists. We see nature as something to be changed, manipulated, maneuvered to bring us additional advantage. We approach it with a spirit of challenge. We want to *master* it. But when it comes to markets, which are man-made, we have an equally fundamental understanding that they are somehow perfect, and that intervention may upset the precarious balance of invisible powers.

If the Japanese had taken the same position with respect to markets that they take with nature, they would still be exporting Christmas tree ornaments, dollar blouses, and cheap toys.

If Americans were to take the same position with respect to markets that they take with nature, they might find that their international industrial competitiveness is in fact dynamic, not static.

Sectoral Targeting

Now the development of strategic industries—*targeting*, to use more contemporary jargon—has been a priority in Japan for at least a century. So when Japan singles out the information industry as a target for the 1980s and 1990s, that should come as no surprise, right?

Well, industry targeting was discovered by Washington toward the end of the 1970s. By this time, MITI had begun issuing its periodic "visions" (white papers), in English, so even we could follow what the Japanese were planning to do. In 1971, Yoshino-san's successors released a long report called "Trade and Industrial Policy for the 1970s." In 1975, they wrote "Japan's Industrial Policy: A Long-Range Vision." And in 1980, MITI laid out its plans for world conquest in a little-noticed document called "MITI's Vision for the 1980s." In Tokyo, these scripts can be purchased at any corner newsstand.

MITI has no crystal ball. But its Industrial Structure Council met and met and met to discuss national commercial priorities for the decade ahead: will the world be friendly or unfriendly? Will growth rates be high or low? What should we do about diversifying our sources of energy? What new strategic industries ought we to be promoting? What is our *strategy?*

The 1980 "vision" included a section on high technology which targeted computers and information technology as national priorities. The handwriting was there for us all to read.

By fall 1980, Congress had heard enough about the implications of MITI's visions that the Subcommittee on Trade of the Committee on Ways and Means commissioned its own analytical report: "High Technology and Japanese Industrial Policy: A Strategy for U.S. Policymakers." By this time, Japan's VLSI project had successfully ended. VLSI is high-tech shorthand for Very Large Scale Integration and refers to new generations of semiconductor technology. Silicon chips, they had determined, would be the crude oil of the 1990s.

When the first silicon chip was devel-

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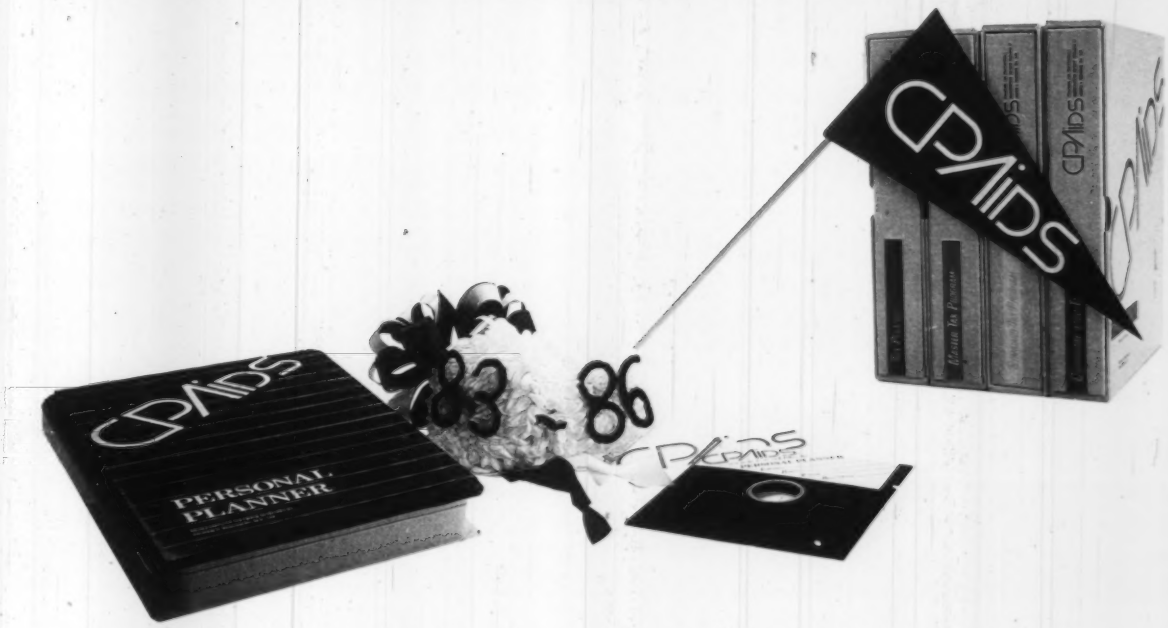

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oped, in the early 1960s, it was called the 1K. One thousand bits of data capable of being stored on a chip of silicon no larger than a little fingernail. The next generation was a 2K. Then a 4K. Then a 16K. (They jump geometrically when they grow, for reasons known only to binary theoreticians and children educated in digital math.)

The 16K was called LSI—Large Scale Integration. Its offspring, the 64K, was the VLSI, which the Japanese targeted. The 64K chip has the same computing power of the first Univac. So all that power, which once would have filled a living room, now fits on your fingernail and had become the industry standard. The Japanese have about a 75 percent *global* market share in these chips. And they are on the threshold of commercializing the 256K RAM chip before Washington can say "industrial policy."

They are on the threshold of commercializing the 256K RAM chip before Washington can say "industrial policy."

Of course, it could have been worse. The Japanese could have taken a page out of the French text and simply nationalized their high technology industries. That wouldn't have been unfair; it is a good old barbarian practice called socialism. But the Japanese liked their way better. It had worked for more than a hundred years.

The Semiconductor Industry Association commissioned a Washington law firm to study the problem. If U.S. firms were losing global market share to the Japanese through this insidious technique called industry targeting, they reasoned, then a modern-day Paul Revere had to tap out a warning on his TRS-80 and get the message to the home folk. Its report, "The Effect of Government Targeting on World Semiconductor Competition: A Case History of Japanese Industrial Strategy and Its Costs for America," was published in early 1983.

"In the mid-1970s," the SIA said, "the Japanese government set a long range goal—world leadership in the high technology industries. The development of Japan's semiconductor industry was a central element of this program."

You start to conjure up images of smoke-filled rooms with lots of green tea, blackboards, and chalk.

"Accordingly, the Japanese Ministry of International Trade and Industry *targeted* (their emphasis) Japan's semiconductor firms for accelerated growth," the SIA report went on. "MITI took a series of major steps to ensure that Japan's leading semiconductor firms would achieve marketplace and technological preeminence."

Well, as we know, it is really no different than what the Japanese have been doing time and time again, from dollar blouses to automobiles to steel. Why should we be any more concerned about these little pieces of silicon? Let the SIA answer that question.

"Loss or even serious injury to the U.S. semiconductor industry would be profoundly damaging to this country. Our industrial base, and indeed, our future as an industrial power, increasingly depend on semiconductor technology. Semiconductors form the basic memory and logic elements of computers. They are revolutionizing such diverse fields as telecommunications, automobiles, industrial robotics, aviation, security systems, genetics, medicine, and virtually all segments of the consumer electronics and information processing industries. They have pervasive military and space applications; they have made possible, for example, the development of precision-guided 'smart' weapons and Cruise missiles. In a very real sense, our national security rests on these devices."

Basically, there is nothing wrong with shooting for high volume production in these little things, according to the SIA. In fact, you *need* high volume production to ride the experience curve and to get your unit costs down. Which happens very quickly. In the early 60s, you could buy a 2K chip for about $50. Now you can get a 64K for less than $10.

So "a competitive strategy aiming at volume production does not violate the rules of the international trading system," the SIA concluded. "Indeed, U.S. semiconductor firms themselves employ such a strategy. However, the Japanese have added a crucial element to the equation—government targeting. Government targeting entails a series of government measures that are designed to ensure volume advantage for Japanese firms and that fundamentally distort free market competition."

The solution?

Stop it.

The SIA said "the U.S government should announce as U.S. policy that foreign industrial targeting practices will not be allowed. . ."

So recently the Department of Commerce has been trying to talk MITI out of targeting strategic industries. I think they might have better luck trying to get the Japanese to stop using chopsticks.

256K RAMs and other VLSI chips are assembled in clean rooms. (Toshiba)

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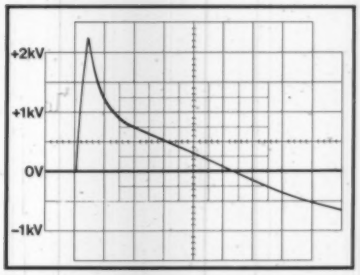
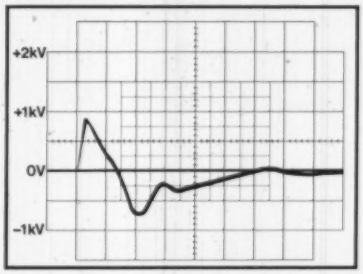


The unsuppressed surge reaches a peak of 2,200 volts.

$150 suppressor



Protection from a unit costing over $150 allows an 870 volt surge through the line with a 750 volt residual surge close behind.

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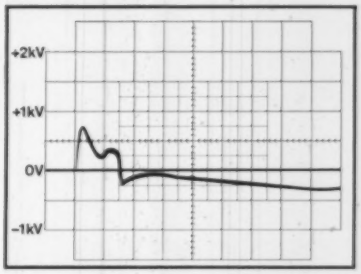

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Optimism and Pessimism

The outcome all depends on whether you are an optimist or a pessimist.

The optimist says the glass is half full. We may be a post-industrial society getting slapped around by the Japanese, but they are on their way, too. Once they stop saving so much, quit working so hard, get out of production and into consumption, they will be just like us: overweight and undernourished. It is inevitable. After all, Korea and Singapore and Taiwan are all gearing up to take production in basic industries away from Japan as the Japanese experience their own declining industrial base.

The pessimist says the glass is half empty. The reason the Japanese save so much and work so hard and stick with industrial production is that they have game plans and strategies that enable them to do so. They *sacrifice*, just as we used to do before and during the war. So they are not about to eat frozen dinners or play golf every week or relax any of that Zen-inspired discipline that has brought them where they are today. Nor are we likely to rev up our own Industrial Policy and play the game by their rules. If we were going to do that, we would have started getting serious years ago when the Arabs discovered that oil was a weapon as well as a lubricant. It is inevitable. The twenty-first century is theirs. For them, it is a matter of national survival.

Conventional wisdom says, not to worry. In the long run, market forces will have a leveling effect on everybody, including the Japanese. But, as Keynes said, in the long run we are all dead. So unconventional wisdom says, worry. In the short run, the guys who goose up market forces stand a better chance of surviving.

"We are facing another Sputnik now—a Japanese Sputnik."

—David Nitzan, Director, Industrial Robotics, Stanford Research Institute

Since Sputnik was viewed as a threat, the Russian satellite helped us develop a consensus and a national strategy to counter that threat.

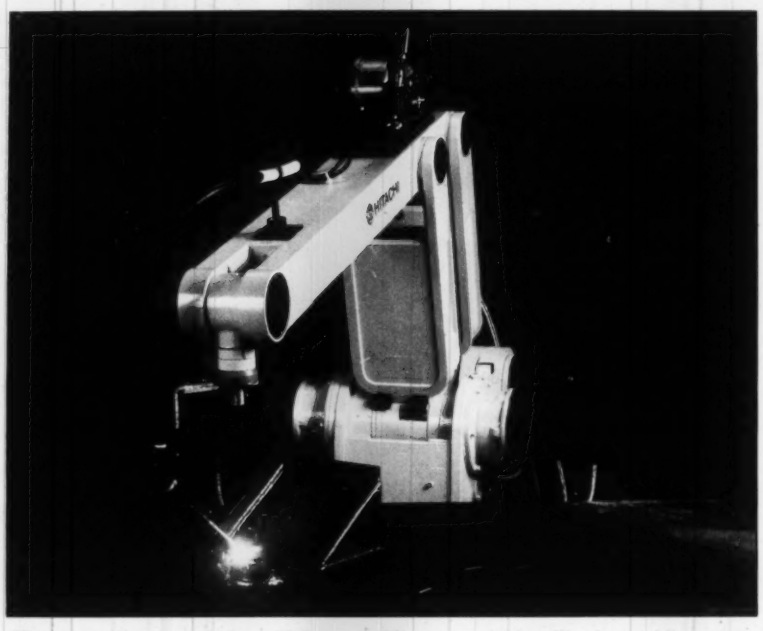
But the Japanese are our political allies. So when they make better cars and higher quality steel and more advanced electronic products, we don't even perceive them as a challenge. It is just unfair trade practices and closed markets and insidious industrial targeting. We are not really doing anything wrong, just drifting along with the free market tide to our post-industrial island in the sea.

Can you imagine the public outcry in 1957 if our political leaders had told us not to worry? Sputnik is nothing more than the product of a centrally planned economy that is characterized by inefficiency and imbalance. Central market economies depend upon government intervention, but free market forces will enable us to surpass the Communist threat and launch our own artificial satellite in good time.

Well, the Japanese may be our political allies. But they are also our most formidable commercial competitors, across the board. The problem is, we don't view politics and commerce as ideological equals, so we don't perceive a commercial challenge the same way we perceive a political threat.

But remember what former British Prime Minister William Gladstone said: "Nations do not have permanent enemies, nor do they have permanent friends. They have only permanent interests." Is it in our permanent interest to see any country, including Japan, achieve such a degree of industrial superiority that America is relegated to the status of a second-rate industrial power?

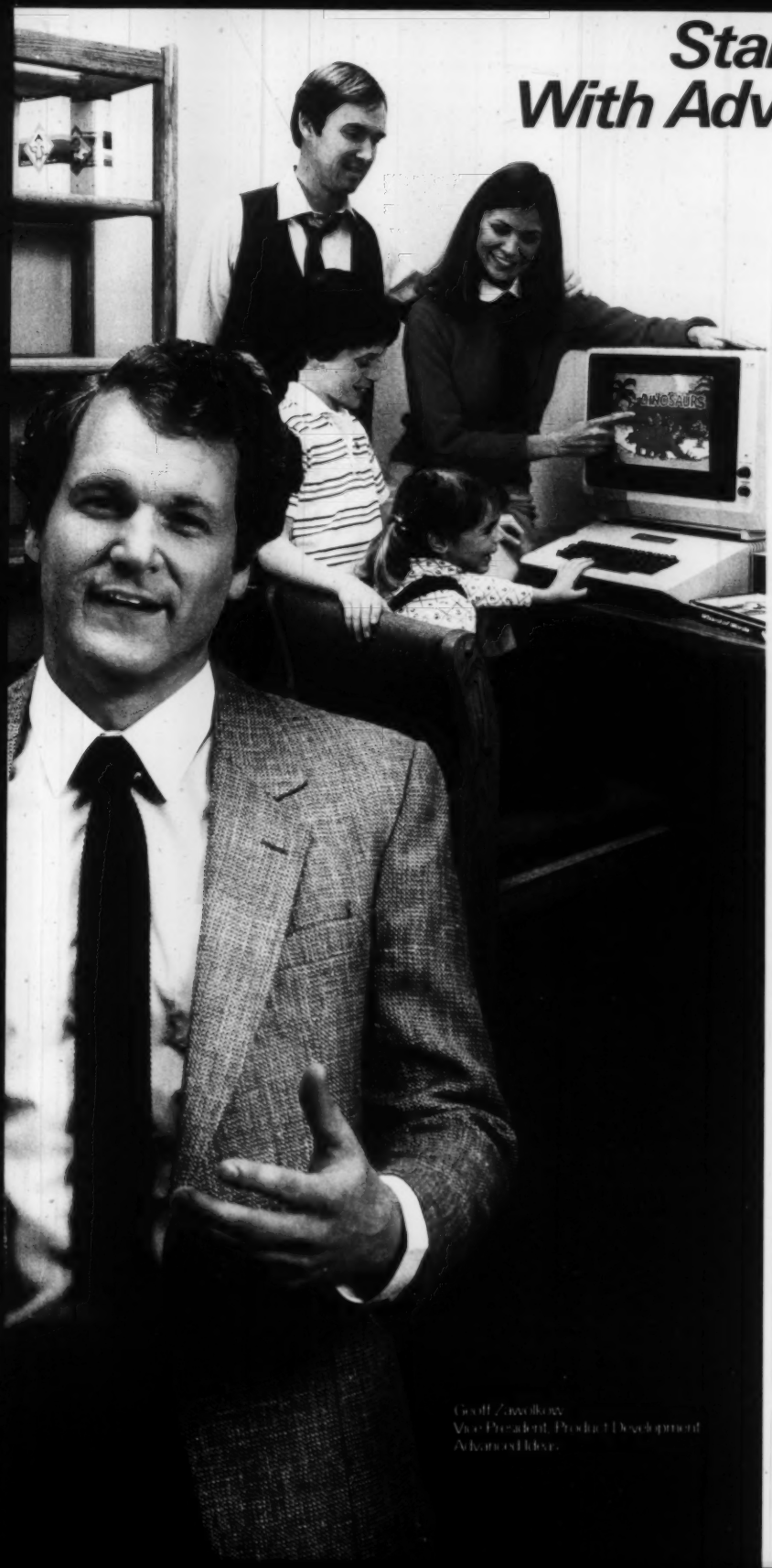
"The (erroneous) American assumption," Adam Smith wrote not long ago, "is that future Japanese will be just like present Japanese: polite, agreeable, golf-loving baseball fans. They put on white lab coats and make tape cassette players the size of your thumbnail. But money and economic activity have their own momentum, and if the glory is coming from missile frigates, that is not the same mentality that makes microwave ovens. Maybe future Japanese will be more independent and less agreeable. If the Japanese start making F-15s, the F-15 may come out lighter, smaller, and half the price. *Then* where do our customers go?"



Hitachi multi-purpose robot will do arc welding, material handling, assembling, etc.

But, you say, the Japanese don't make F-15s. They make transverse-mounted front-wheel drive engines and automatic-reverse mini-videotape recorders and high-speed electronic computers. Well, all those nifty commercial products, which Japan now dominates, revolve increasingly around one tiny ingredient: the random access memory chip. And they do, in fact, make F-15s, but not for export. By licensing American technology, for their Self-Defense Forces.

The reason we don't perceive a Japanese commercial threat is the same reason we didn't perceive a Russian rocket



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threat until October 5, 1957. We have no national strategy.

We are astonished at the Japanese economic achievements, but we are not humble enough to take them seriously. Once we do, the strategy formulation process will start soon enough. The problem is, all the ideas being generated in Washington come under the rubric of tactics, not strategy.

So we have to put ourselves in the wooden sandals of the Meiji oligarchs a hundred years ago to see if we can get a feeling for how the process goes.

First, they started with a buzzword, a rallying cry. *Strategic industries.* More than the two syllables of Sputnik, to be sure, but then Japanese is that kind of language.

To compete more effectively we must formulate a new strategy, just like the Meiji oligarchs did in 1872.

Then, they developed a strategy. *Exports and national defense.* Everything connected with those strategic industries got priority attention. If you wanted aggressive Federal tax credits for a fast food franchise in Yokohama in the 1880s, friend, you were out of luck.

And finally, they worked out the tactics. This took a long time, but they were eventually refined and honed. All under the rubric "Industrial Policy." All motivated by the higher productivity, aggressive-export, greater value-added philosophy. All under the coordination, coherent guidance, and watchful eye of MITI.

So the solution to our economic decline does not lie in scapegoating and protectionism, but rather in steps we ought to be taking ourselves to recapture our own international industrial competitiveness. This means that to compete more effectively we must formulate a new national strategy, just like the Meiji oligarchs did in 1872.

Otherwise, we run the risk of becoming a first-class military power with a second-class industrial base. 完

Washington Versus Tokyo: The Technorivalry

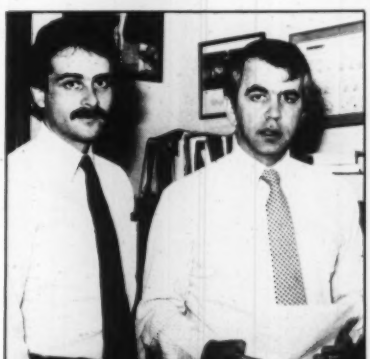
Japanese Competition and U.S. Response In An Era of Technological Challenge

ワシントン対東京・技術競争

U.S. Senator Paul E. Tsongas and Mitchell G. Tyson

A New Era

We have entered a new era characterized by rapid technological advances, the evolution of domestic markets into global ones, and sharp international challenges to the U.S. technological and economic positions. That we are entering a new high tech era is widely recognized. The implications of this new era, however, are only now beginning to be understood. As a nation we are not yet fully prepared for it. Our success in this new era is not assured.



Paul E. Tsongas (right) is a U.S. Senator (Dem.) from Massachusetts. He was previously a U.S. Representative, county commissioner, city councilor, and in private law practice. He serves on many committees, subcommittees, and caucuses including the Foreign Relations Committee, Small Business Committee, and Energy and Natural Resources Committee.

Mitchell G. Tyson (left) works for Senator Tsongas as senior legislative assistant, science advisor, and project director for industrial competitiveness.

The pace of technological change is escalating. The synergistic effects of complementary technological advances are beginning to revolutionize our lives. We are seeing the extraordinary effects of the combination of semiconductor breakthroughs, new computer architectures, and telecommunication networks. We are seeing how robotics is changing manufacturing, fiber optics is changing communications, genetic engineering is changing chemical processes.

Imports and exports are an increasingly important component of the U.S. economy. A rapidly growing number of domestic industries must compete internationally to survive. The impact of international competition has been painful, as domestic industries such as shipbuilding, steel, textiles, consumer electronics, and autos have been won by our competitors. The phenomenon of globalization is even starting to hurt Japan, our most potent challenger. Its steel, textile, and consumer electronics industries are, in turn, being challenged by the so-called mini-Japans: South Korea, Taiwan, Singapore, and Hong Kong.

The reasons for the erosion of the U.S. international competitive position are complex, but largely identifiable. Our economic conditions and business management practices have discouraged high risk, long-term investment in new technology. We have been devoting a declining percentage of our GNP to R&D and have witnessed deterioration in our educational system.

While we have drifted, our competitors have been exhibiting great determination in building their technology bases and capturing U.S. markets. The Japanese have been particularly successful in combining a supportive government and an aggressive private sector to challenge an area of traditional U.S. leadership—high technology.

The importance of our rapidly growing and advancing high technology industry is clear. Potential markets for high technology products are huge. High technology advances are crucial to revitalizing basic industries and increasing productivity in the service industry. And high technology provides the competitive advantage our weapons have over the Soviets—thus it is critical to national security.

The Competition

High technology is an area of traditional U.S. leadership. The quality of our scientific establishment and the vitality of our small business sector are two of our strengths. But our international competitive challenge has been stiff. Through a combination of taking advantage of our science and our willingness to share it, unfair trade practices and protectionism, careful engineering and hard work, smart

long-term investments, and targeted government policies, we have been brought down from a position of dominance. In some market segments we have been beaten. The challenge is broadening into other areas, and if trends continue we could be in serious trouble.

The litany of Japanese strengths is a familiar one and includes comparisons of R&D spending as a percentage of GNP, educational standards and numbers of engineers, percentage of GNP spent on defense, management practices and labor attitudes.

Perhaps the most interesting comparison, and one that represents a fundamental difference between the U.S. and Japan, is that of the government-industry relationship.

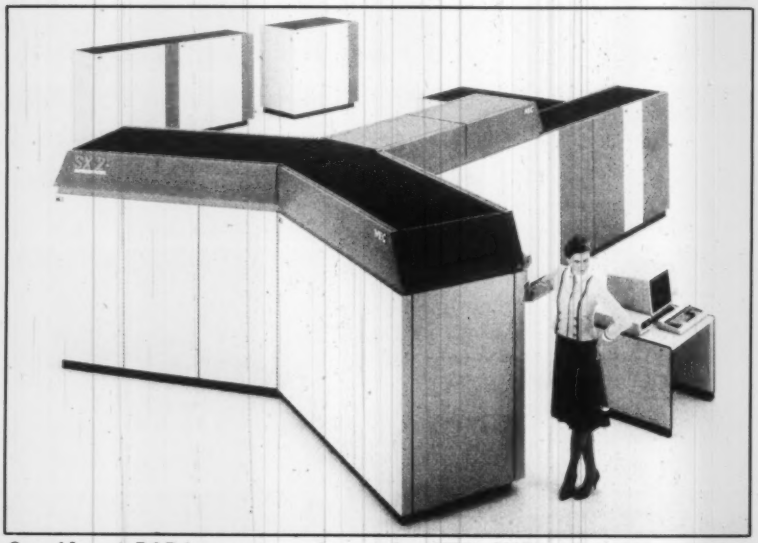
For a long time it was thought that the U.S. was competing against Japan Inc.—a national economy that functioned like a single corporation. This view has been discredited. However, Japan often performs as if it were acting under centralized guidance. The organizational heart of this process seems to be the Ministry of International Trade and Industry (MITI)—the Darth Vader of the Japanese economy. But how MITI operates is still largely a mystery to most of us in this country. There is no analog in American experiences.

Does MITI sit down with its 3000 engineers, divine the future, and issue "guidance" to corporations, who for cultural reasons, generally acquiesce? Or does MITI listen to its industries and merely reflect industrial consensus, providing governmental assistance where appropriate? It is hard to tell.

What we do know is that Japan, in several areas, has demonstrated the ability to anticipate long-term technological and market opportunities and develop a national consensus among institutions to invest accordingly.

Japanese managers are willing to sacrifice short-term profits for long-term market share.

Consensus building is an integral part of Japanese culture. Goal setting is approached cooperatively, and implementation is a joint effort. In the U.S., groups vie for influence. Decisions are rarely final and a consensus is not enduring. Individual rights are pursued in the courts and in Congress, like sporting contests to determine winners and losers, while the national interest hangs in the balance. The only winners are the lawyers and lobbyists.



Out of Japan's R&D have come products such as NEC's SX-2 supercomputer, capable of performing 1.3 billion floating point operations per second.

There is also a sense of strategy in Japan. Protectionist policies were adopted in the 60's and 70's to foster the development of growing high tech industries, which can now compete on their own. In the U.S., protectionism is bestowed on old industries, which decline further because of reduced competition.

Japanese management worries about being technologically competitive, tempering concern about rates of return with regard for long-term survival. Japanese managers are willing to sacrifice short-term profits for long-term market share. The Japanese also concentrate on quality control to improve reliability, worker participation to keep motivation high, and product improvements to keep costs down and expand markets.

Japanese firms also benefit from an economy in which savings rates are high, debt represents a larger share of corporate finance, and the yen is undervalued. A recent study entitled "The High Cost of Capital: Handicap of American Industry" by Dr. George Hatsopoulos, sponsored by the American Business Conference, found that the effective cost of capital in the U.S. is twice what it is in Japan! This means that the Japanese can justify investing in more long-term and high risk/high payoff research and development projects than we can. In the long run, our underinvestment will make us less competitive.

The Japanese efforts have been extraordinarily successful in developing steel industries, shipbuilding, consumer electronics, autos, manufacturing technology, and now high tech, as well. The most startling success has been the capture of 70 percent of the market for the most advanced commercial memory chip, the 64K RAM. The Japanese success here was a direct result of the joint government/industry program set up by the Ministry of International Trade and Industry in the mid-1970's.

Admittedly, U.S. industry must compete with Japan not only for markets, but also with the U.S. military for resources. Japan devotes 1 percent of its GNP to defense. We spend 4.7 percent. These large defense expenditures compete with the commercial sector for capital and engineering manpower. High technology weapons procurement typically involves high cost/low volume items designed with special military characteristics in mind. To be competitive, commercial production must stress high volume and low cost. The increas-

ing shift of basic R&D into the Defense Department is likely to further limit scientific communication for reasons of national security.

Ironically, the Japanese owe many of their economic gains to their ingenuity in applying U.S. R&D. Now Japan is embarking on an aggressive program to stimulate new technologies indigenously. Joint government/industry programs in biotechnology and materials science have begun. Twenty years ago, the Japanese computer industry started from scratch, but now it is number two in the world. The Fifth Generation Computer Project, whose goal is to develop and commercialize a seeing/hearing/speaking computer with a powerful problem-solving capability, should be of special concern to us. Even if the project falls short of its goal, it is expected to have significant impact on technological and commercial development.

Japan's formula of looking a decade ahead, developing a consensus with industry and putting a program together to achieve goals is a powerful force in stimulating innovation and keeping Japan in the vanguard of technology.

It is interesting to see how the American view of Japan has evolved since the end of World War II, when Japan was viewed as a defeated enemy deserving U.S. help in rebuilding her economy. In the 1960's "Made in Japan" was synonymous with cheap and shoddy goods. In the late 70's, unwilling to admit that the Japanese had caught up to us, Americans blamed our growing trade imbalance on unfair trade practices.

But when we looked beyond some of Japan's non-tariff barriers that clearly inhibited agricultural imports, we found very sophisticated technology and highly competitive products. Japan was viewed as an invincible technological juggernaut. A Japanese management cult developed. Japanese capture of 70 percent of the 64K RAM semiconductor chips was compared to Sputnik. American business and political leaders issued a call to arms.

While characterizations of the Japanese as supermen were overstated, these statements were successful in getting people's attention. The result is that today there is a more balanced view of Japan and an increased awareness of how much our economic growth depends on capital formation, technological innovation, and the competitiveness of American industry in world markets. The most promising outcome is our new appreciation for the strengths and weaknesses of the U.S. economy, government policy, and industrial management.

High Tech Realities

It is in the vanguard of technology that the economic battle between the U.S. and Japan will be fought. The nation that develops new technologies can build new industries around them and incorporate them into existing industries. The nation that develops and commercializes faster will have the competitive edge. Increases in productivity and improvements in global market positions depend on successful innovation.

Given the sophisticated copying of our products by competitors, it is often difficult for an individual firm to realize the benefits of its own R&D.

It is increasingly evident that we do not translate new inventions into commercial products and processes as fast as our competitors do. The key to U.S. industrial competitiveness is an acceleration of our rate of innovation.

To accomplish this we need to increase the level of R&D expenditures; increase the supply of workers with critical skills; upgrade the technical capabilities of all workers; and, increase the level of investment in new technologies and new ventures.

R&D

There are compelling reasons why the private sector underinvests in R&D. Research and development are often expensive, and results are highly uncertain. Given the sophisticated copying of our products by competitors, it is often difficult for an individual firm to realize the benefits of its own R&D. Basic research is unlikely to provide short-term returns on investment, and industry tends to focus on incremental product improvements that can return quick profits.

Basic industries frequently spend little on R&D, and innovations are rare. Improvements in the technology base of a given industry (such as automation, machining, and chemical processing), while important to an industry as a whole, are often too costly and risky for a single firm to pursue. The social rate of return on R&D is often twice the private rate of return.

Compounding this situation is the fact that federally supported R&D is out of balance. While military R&D is up dramatically, civilian R&D is stagnant. While basic research is up, applied research is down. Yet applied research is the critical step whereby basic research is developed to the point it can be ap-

Today, the label "Made in Japan" implies high quality consumer goods such as these radios in an Akihabara shop.

plied commercially. This is the area of greatest Japanese strength.

Federally supported R&D reports slightly less than half of all R&D in this country. But industrial R&D is concentrated on technological development, which is based on the basic or applied research supported by the government. It is critical that the government maintain steady support of basic research and support applied R&D in areas in which industrial support is lagging or which our competitors have targeted, such as the Fifth Generation Computer. The government also should encourage increased levels of industrial R&D through R&D tax credits. The government should take steps to widely or effectively disseminate the results of federal R&D perhaps through technology extension centers. Lastly, the government should provide incentives for industrial development of patents that arise from federal R&D.

Human Resources

Investment in human capital is as important as plants and technology to economic growth. The U.S. work force, if well trained, motivated, and managed, represents a tremendous source of productivity and innovation. Yet assessment after assessment shows that we are failing to develop the human resources needed to meet the technological challenge.

We are failing to provide basic math and science skills to our elementary and secondary school students. Public schools have qualified math and science teachers in only half of all classrooms.

We are producing too few engineers in critical fields and too many of our engineering graduates lack first-rate training. Colleges and universities are hobbled by faculty shortages, obsolete equipment and curricula. There is a serious shortage of graduate students, threatening the future supply of PhDs and faculty. Universities have inadequate resources to match growing engineering enrollments.

We are also failing to keep our work force current with technological advances. Firms are finding it easier to dismiss senior personnel with obsolescent skills and hire recent graduates. This wastes the talents of our most experienced engineers, scientists, and managers.

We must embark on a major program to provide the human resources necessary for us to compete technologically. Modeled after the Morrill Act of 1862, which established the land grant college system that revolutionized U.S. agriculture, a High Technology Morrill Act ought to support partnerships among industry, education, and government to mount a long-term investment in our capacity to provide math, science, and engineering skills at all levels. This is a critical investment we cannot afford to put off.

We are producing too few engineers in critical fields and too many of our engineering graduates lack first-rate training.

Investment

While technology itself is rapidly changing, the risks of investment in a high-cost-of-capital environment are high. Traditional sources of capital do not support such activities when safer investments with shorter paybacks are available. Even venture capital, which is one of our country's basic strengths, is increasingly shifting to lower risk investments with medium-sized firms. As a result, small U.S. firms often end up licensing Japanese competitors because no one else is interested.

The key to increasing the level of corporate investment in R&D, human resources, technology development and new ventures is bringing down the cost of capital. There are no simple ways to do this, however. We need to review all the factors that contribute to the cost of capital, including savings rates, monetary policy, government deficits, tax rates, financial markets, banking regulations, barriers to the international flow of funds, and debt/equity ratios before we can design a comprehensive economic program. The first step is to develop a broader understanding of the importance of the cost of capital in our ability to invest in innovation and productivity.

The Role of Government

It may surprise many people to learn that there exists a coherent government policy that is determining United States international competitiveness. The policy covers such matters as technological innovation and capital investment. Unfortunately, the policy originates not in Washington, but in Tokyo; it is the policy of the Japanese government.

Public investments in R&D and education, and steps to improve our economy and lower the cost of capital, are essential to restoring our competitive position. But to do what is necessary we must come to grips with the fundamental question of what is the proper role of government.

We should not, and need not, adopt the Japanese model. The culturally embedded characteristics of Japan cannot be transplanted. There are also tradeoffs in Japan's approach. The Japanese educational system produces a highly competent and productive work force, but relies on an educational system that stresses rote learning, imitation and memorization, and discourages questioning. Copying this here could stifle the creative and innovative spirit which is our strength.

We must build on our strengths and develop an approach in the American context. Our free enterprise system, which relies on individual firms managing investments and competing, is basically sound. We do not require centralization or new sprawling bureaucracies. It should not entail picking winners and losers. It should spur the private sector to produce more winners, maintain an economic environment in which winners stay winners, and help losers become winners if possible. Private firms can best combine technology, manpower, and capital to create economic goods. But government must assure an environment in which these resources are available and economic incentives exist to encourage the most effective use of these resources.

In this country there is an endless ideological debate about whether the government has a role to play in strengthening our industrial competitive position. The issue is cast starkly: laissez-faire versus government planning. Such a debate is irrelevant and pointless.

The United States has an industrial policy whether it is acknowledged or not. Such a policy is inherent in numerous specific policies concerning such things as taxes, patent and antitrust laws, export regulations, research and development budgets, and educational priorities. This bundle of policies creates

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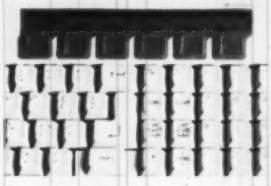

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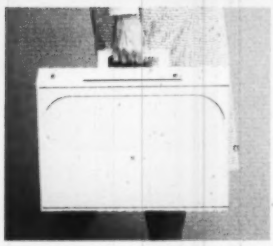

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an environment in which American firms must conduct business and compete.

The real issue is whether or not the United States ought to develop a coherent policy to enhance its economic competitiveness. The answer is obviously that we must—our economic survival depends on it.

American firms are no longer merely competing among themselves. They must compete in an international marketplace. Many high tech companies must compete against Japanese enterprises that have the support of the Japanese government, Japanese banks, and Japanese labor all acting in concert. The odds are thus stacked against American business. This changing reality ought to prompt a revision of American industrial policy.

Devising a coherent industrial policy will inevitably lead to a balancing of competing interests. There are few easy choices. But the imperative of strengthening our country's competitiveness has a Darwinian logic of its own that will force us to face the issues one way or another. The sooner we face them, the better. The issues arise in several areas:

• *Military security versus economic growth.* Concern over Soviet advances has caused the Administration to seek broadened authority to control the export of goods, technology, and even academic exchanges. Extending export controls to new commercial technologies can slow technological development and weaken the competitiveness of firms in the United States. While there is a need for restrictions on transfer of sensitive technologies that have military applications, the Administration's tilt toward broader controls threatens to damage our economic security without stopping the hemorrhage of technology.

The focus instead should be on narrowing and improving our export licensing procedures. For example, high-power laser technologies have significant commercial and military applications. Restricting shipments of commercial products that are being actively marketed by competitive firms in other countries will not improve our military security. The result will be lost sales that can only damage our continued strength and the development of this important technology.

• *Antitrust enforcement versus economic cooperation.* In another epoch when the United States economy was relatively insulated from outside competition, our antitrust policies made some sense. But changing circumstances of international competition have outpaced the law. In some cases, antitrust laws are now an unacceptable burden on firms that must cooperate in important, albeit limited, ways to meet the international competition.

Restricting shipments of commercial products that are being actively marketed by competitive firms in other countries will not improve our military security.

Research and development projects may be beyond the financial or technological capacity of any single firm acting alone. This is the case with some advanced computer and semiconductor technologies, as well as in steel and textiles. The Microelectronics and Computer Technology Corporation, a research consortium of 12 United States firms, is just now beginning its high risk initiative in advanced computer design to match the Japanese. But MCC faces uncertain status under current antitrust laws. This country must relax its antitrust laws to encourage such joint research ventures.

• *Fair trade versus free trade.* When Japan targets the Fifth Generation Computer and begins to allocate resources towards its development, that is not unfair. It is smart. We are wasting our time in asking Japan to refrain from such initiatives.

But when the Japanese restrict their markets to United States exports or zero in on our markets with predatory pricing, that is unfair. We must not tolerate these practices. Negotiation is the best means of settling disputes of this kind. Protectionist tit-for-tat tends to escalate to everyone's disadvantage. But if threatening the Japanese with protectionist reprisals is the only way to get them to the negotiating table, then threaten we must.

• *Sunrise industries versus sunset industries.* Industrial policy has been criticized as an ill-fated effort to pick winners and losers. This casts the issue incorrectly. The government has no business favoring petrochemicals over lasers or bioengineering over turbines. The market is the best arbiter of these choices. The government ought to fashion policies that will recognize the needs of different industries.

For example, semiconductor manufacturers face competitive pressures that are different from those in the textile industry. Antitrust reform might help the former but not the latter, while government-sponsored research on synthetic materials might help the latter but not the former. There is no reason we cannot do both. Tailoring government policy to the differences can create more winners and offer losers the best opportunity to turn themselves around.

Though none of these issues is novel, their importance for American economic well-being is the new, overriding reality. It is high time for a United States strategy attuned to this reality.

Programs

While partisan political battles rage over whether we need a national development bank or whether we should let the market respond without government help, progress is being made on a range of fronts.

• Congress is taking steps to extend the R&D tax credit that is so important in correcting market imperfections that inhibit corporate R&D.

• There is growing Congressional support and legislative progress to enact the High Technology Morrill Act to provide matching federal funds to joint industry/university projects to improve technology education.

• Congress is taking actions to modify government export policy to strike a more reasonable balance between export promotion and national security.

• Legislation to change our antitrust laws to encourage cooperative R&D ventures is also progressing, as is a bill to extend copyright protection to semiconductor designs.

These are welcome changes in policy that are more than matched by changes in the private sector, such as the increasing attention being paid to U.S. management techniques and companies that exhibit the American brand of excellence. There is increasing support for worker participation, export marketing, and increased R&D. Nowhere are these signs stronger than in our high tech industries.

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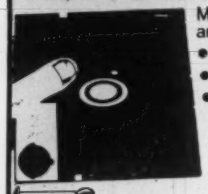

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ment falls significantly short of the national strategy, and mobilization of scientific, human, and capital resources necessary to create a climate that encourages strengthened U.S. industrial competitiveness. While there is a growing consensus among business leaders and Congressional leaders, there still is no Presidential leadership.

In our political system there is no substitute for Presidential leadership. While the Congressional legislative agenda developed cooperatively with industry is a good one, Administration support is uneven. Competing priorities in the areas of national security and the budget deficit, as well as an ideological bent for leaving education to the states and applied R&D to industry, have prevented the Administration from developing a coherent program or even lending consistent support for Congressional initiatives. The most encouraging sign has been the establishment of a National Commission on Industrial Competitiveness, which is expected to make its report this fall. Hopefully, this will be the catalyst for Presidential leadership.

In conclusion, while we are making some significant progress in improving our competitive position, we do not have the national strategy and consensus necessary to accelerate that progress. The challenge is to meld the entrepreneurial strength of the private sector and the broader perspective of the public sector into a system that assures action and efficiency. The federal government must place high on the national agenda the need to strengthen our international competitive position.

Our nation's greatest achievements have always been the product of leadership. In building a transcontinental railroad to the Pacific, in constructing the Interstate Highway System, and in putting a man on the moon, the federal government looked to the future. Today it can set national goals to focus both public and private resources on assuring the success of American competition in a new era of technological challenge. 完

Answers to Quiz

1. Fujitsu, **2.** NEC, **3.** Epson, **4.** Matsushita, **5.** Canon, **6.** NEC, **7.** Mitsubishi, **8.** Sharp, **9.** New Jersey, **10.** Personal, **11.** 2.5%, **12.** False, **13.** Same, **14.** Hitachi.

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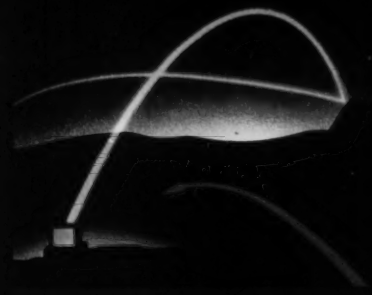

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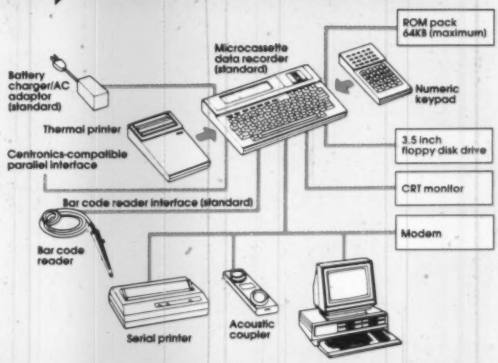

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Unbundling Japan, Inc.

Software, satellites, and bureaucracy may limit future Japanese economic growth.

日本を斬る

William V. Rapp

Everyone agrees that Japan's postwar economic success has been truly spectacular. While the Japanese government's precise role and influence in this unprecedented development is sometimes debated, it is generally agreed that government policies at both the macro and micro level facilitated the process. As other observers have pointed out, Japan at the end of World War II was a country with few resources except a well educated, hard working labor force. She had little arable land, 100 million people to feed, and few energy or natural resources. Food, energy, and natural resources would all have to be imported and paid for with exports if Japan was to survive, much less prosper.

Basic Policies Spur Growth

To accomplish this fundamental requirement, Japan needed an internationally competitive manufacturing sector producing products for which there was worldwide demand. Japan had to export in order to import. From this logic, some basic policies evolved which underpinned Japan's spectacular postwar growth. However, since 1973, their effects have become less benign.

Competitive growth in manufacturing requires substantial investment. For this investment to be noninflationary, thereby maintaining international competitiveness, it must be supported by a high rate of savings. The government, therefore, instituted substantial incentives for promoting savings; itself running a budget surplus until the 1970's. These funds were in turn channeled to key business sectors through administrative guidance, budget incentives, lending policies by government banks, and Bank of Japan rediscount policies.

Fertilizer, ship building, steel, power, and coal were targeted as key industries to reduce transport and foreign exchange costs.

Government policies supported the promotion of light industry exports such as textiles, for which there was substantial worldwide demand and for which low cost labor was a prime requirement. Fertilizer, ship building, steel, power, and coal were targeted as key industries to reduce transport and foreign exchange costs and as necessary to successful industrialization generally.

As imported oil became cheaper than coal, Japan phased out coal and pushed to reduce the cost of imported oil. This led to larger oil tankers, more demand for steel, and large investments in oil refining, chemicals, and petrochemicals.

The Heavy Industry Bureau of MITI had responsibility for the development of these basic industries and became the architect of Japan's postwar industrial policy. As the government of Japan, MITI, and the Japanese public all wished to raise their growth and standard of living, over time they raised their sights to industries with more value added and technical complexity: in succession, autos, consumer electronics, computers, semiconductors, bio-technology, and space.

The model for industrial development in each case has tended to be the same: First there is import of the product and development of the domestic market (including government subsidies, technology imports, cooperative R&D, low cost loans, etc.). As investment grows and costs fall, the industry begins to export first to less developed countries where competition is less and finally to the advanced countries. In time, as the economy grows in size and sophistication and as capital generation becomes substantial, the need for subsidies is reduced. Indeed, the value of the Japanese market itself along with low cost capital are the pillars supporting industrial evolution.

In this context, import substitution has led to rapid growth in demand supported by large scale investments funded by high debt levels. Large scale invest-

William V. Rapp is the Senior Commercial Officer in the U.S. Embassy, Tokyo. Prior to joining the U.S. Department of Commerce, he held senior positions with the Bank of America, Morgan Guaranty Trust Co., and Boston Consulting Group. He also worked for Toyo Menka Kaisha and has taught at Yale, Columbia, and NYU.

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2

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ment and the lower cost of debt capital (due to tax deductability) in turn resulted in lower costs, lower prices, more demand, more investment, and the search for other markets, including exports. This situation continued until domestic and export markets were saturated or politically limited.

Changes in the Economy

This economic growth engine continued at accelerating rates until a series of events dramatically changed Japan's economic context. Domestically, many major industries such as steel, nonferrous metals, chemicals, and pulp and paper matured. Further investments and lower prices did not expand demand domestically nor overseas.

Japanese computer companies, NEC, Fujitsu, and Hitachi emerged as the only serious global competitors to U.S. firms.

In addition, the other developed countries, as well as the non-industrial nations were interested in limiting Japanese exports either to stem the erosion and employment effects of Japanese imports or to promote their own industrial development.

On top of this were layered two oil shocks that increased the price of oil 40 times, the floating of the yen with a net appreciation of 20 to 30 percent, and a disillusionment among Japanese with growth for growth's sake. The last in particular was fueled by some spectacular pollution cases, which, combined with the worldwide ecological movement, prompted the Japanese to adopt the world's strictest pollution legislation.

It was these events that prompted the government of Japan and MITI in particular to promulgate an acceleration in Japan's intent to move out of heavy industry into knowledge-intensive industries such as computers, biotechnology, fashion, management consulting, engineering, and so on. Within this development, of course, computers, semi-conductors, telecommunications, satellites, and software development were the key sectors just as steel, ship building, chemicals, and autos had been earlier.

Not surprisingly, techniques similar to those used earlier were employed: investment by foreign firms was limited until 1976, and tariffs were held at high levels. Also, administrative guidance was used to encourage sales by domestic companies. In addition, R&D cooperatives were formed, government funding was provided, and loans to key firms were facilitated.

Capturing the Lead in Information Processing

The industry's growth and progress prospered, particularly in semi-conductors, including large scale DRAMS. Japanese computer companies, NEC, Fujitsu, and Hitachi emerged as the only serious global competitors to U.S. firms. More recently, Japan announced its Fifth Generation artificial intelligence and Supercomputer projects and has served notice of Japan's intention to capture the lead in information processing from the United States. Indeed, the pressure on Japan and MITI to accomplish this objective has grown substantially since the first oil shock.

As a result of dramatic increases in energy costs in Japan, some 24 industries—in which over 50 percent of operating cost is accounted for by energy and raw material—are classified as structurally depressed. Though these industries were built with export sales in mind, exports usually lose money even on a cash basis. Most of these industries, including chemicals, petrochemicals, pulp and paper, fertilizer, lumber, and plywood are thus operating at 50 to 60 percent of capacity. But some, like aluminum, are operating at as low as 20 percent of capacity. Since domestic sales amount to more than $100 billion, the threat of increasing imports is apparent. The government also has a major program underway to scrap capacity and rationalize these industries.

A combination of maturing demand, depressed industries, and a continued high savings rate have slowed economic growth considerably in the last few years from around 6 percent in the 1970's to 3 to 4 percent currently. This in turn has decreased demand and investment opportunities, further slowing growth.

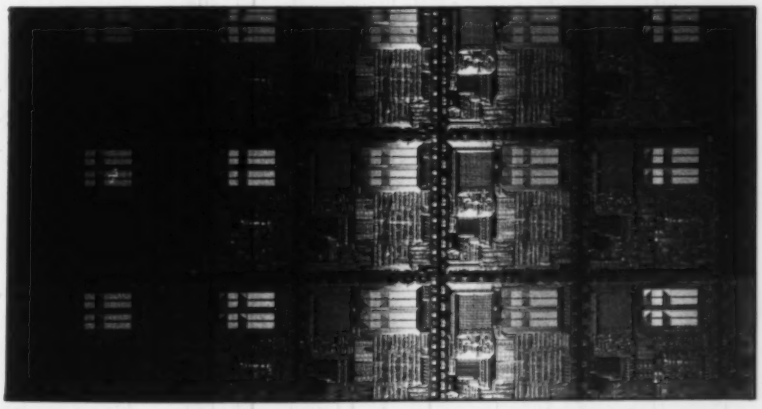
High budget deficits have stimulated fiscal conservatism, curtailing budget expenditures, while investment and pressures to keep the yen strong have limited expansionary monetary policy. Thus macro growth policies have been restrained.

Pressures from the non-industrial countries in Japan's traditional industries is growing not only in export markets but in Japan itself. Korean and Taiwanese textiles, steel, ships, and consumer electronics are all factors in the marketplace.

The Role of Government

Given the above factors, the pressure on Japan to find a major, even leadership, role for itself in the information age is very severe. Yet, there is no clear government agency with the mandate to achieve this result.

Though MITI's general industrial policy vision, for the 1970's and again the

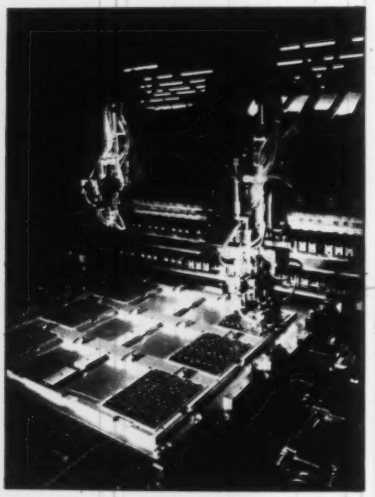


The only serious competition to U.S. semiconductor firms came from Japanese companies such as Hitachi, Fujitsu, and NEC. Photomicrograph shows Hitachi microprocessor chips on a wafer before being cut apart.

1980's clearly sets forth Japan's reasons and objectives in moving toward a post-industrial economy, legal responsibility for several key post-industrial sectors lies with other ministries.

The Machinery and Information Industries Bureau of MITI does not have the same mandate for the 1980's and 90's that the Heavy Industries Bureau had for the 1950's and 60's. The responsibility appears more dispersed: The Ministry of Education (MOE) has responsibility for University based R&D, copyrights, and education; The Ministry of Health and Welfare (MHW), for biotechnology, medical equipment, and pharmaceuticals; The Ministry of Finance (MOF), for information based financial services, electronic banking, and automatic funds transfer; The Science and Technology Agency (STA), for space and satellites; The Ministry of Post and Telecommunications (MPT), for telecommunications including enchanced services; MITI, for information processing industries, semiconductors, space hardware, and patents.

While MITI has tried to extend its mandate through organizations in areas such as bio-technology, software, and telecommunications (often administratively populated with ex-MITI bureaucrats), their administrative responsibility is weak.



NEC assembly robot inserts ICs on PC boards. This "intelligent" robot can be linked with other automated robots or equipment to form an integrated assembly line.

The other ministries appear jealous of their turf and want their turn at being responsible for part of Japan's future. In this sense, Japan remains very different from the United States in that the big bureaucratic question is not whether government should manage Japan's entry into knowledge intensive industries as in the traditional model but which ministry should manage it. However, it is also apparent that business interests would like to see a greater degree of freedom, at least from control over certain industries.

The big bureaucratic question is not whether government should manage Japan's entry into knowledge intensive industries but which ministry should manage it.

Some recent U.S./Japan trade policy situations involving VANs (Value Added Networks), software registration, and communications satellites are instructive in illustrating some of these divisions and shifting interests, as well as the economic stakes. There also appear to be some new developments in the wings.

In the case of VANs, the issue has been who will control the delivery of information services by telephone cable, satellite, or radio wave, not whether it should be guided. While MITI has argued for complete liberalization with respect to establishing VANs, it hopes to exercise its authority via its mandate to promote firms developing/producing related hardware and certain software. Indeed, VAN liberalization in conjunction with its software registration package would enable MITI to exercise full authority over both VAN hardware and the services transmitted (software packages).

MPT, on the other hand, wishes to retain authority over the use of telecommunications facilities just as it did several years ago with respect to time sharing services. And in the end, the result appears similar: a partial compromise, but with MPT retaining authority. The foreign ownership, MPT inspection, and licensing requirements have been dropped, but an MPT registration and notification system are retained. In addition, hardware must meet common carrier interconnect requirements and standards.

The MOF may also want some guidance over VANs used for financial services. But some conflicts may soon arise with the major city banks who want to run their own nationwide VANs independent of Nippon Telegraph and Telephone and the MOF.

MITI's Motivation

MITI's motivations in developing a new system for protecting software appear even more clear cut:

- The U.S. lead in software seems substantial and does not appear to be narrowing. The U.S. has ten times as many programmers as Japan.
- The period of protection under copyright law is so long that much of the basic existing computer programming languages and microcode used worldwide, including in Japan, will remain under U.S. control for the next several years (e.g. IBM 360-370 based software systems).
- While copyright law permits the writing of new software to achieve the same results, it does not allow copying or add-ons without the orginators' approval. In certain cases, MITI does not feel Japan has time to spend writing new software. Also this would force Japan's limited programming resources to reinvent the wheel. Given the rapid rate of change in this area, this could place Japan at a competitive disadvantage in software for some time.
- From MITI's view, helping users, including hardware producers, gain access to important software is as critical as protecting software developers.
- Copyright law applies automatically and on an international basis even if a program is not formally registered. This approach substantially reduces the ability for government to interfere in the process as well as to discover via an application process how the program was created.

For all these reasons, MITI has tried to replace copyright protection with their own version of software protection registration, claiming that software is so inextricably tied to a machine that it is an economic property. Therefore, a patent process, which MITI controls, is more appropriate.

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System Saver™ filters out damaging AC line noise and power surges.
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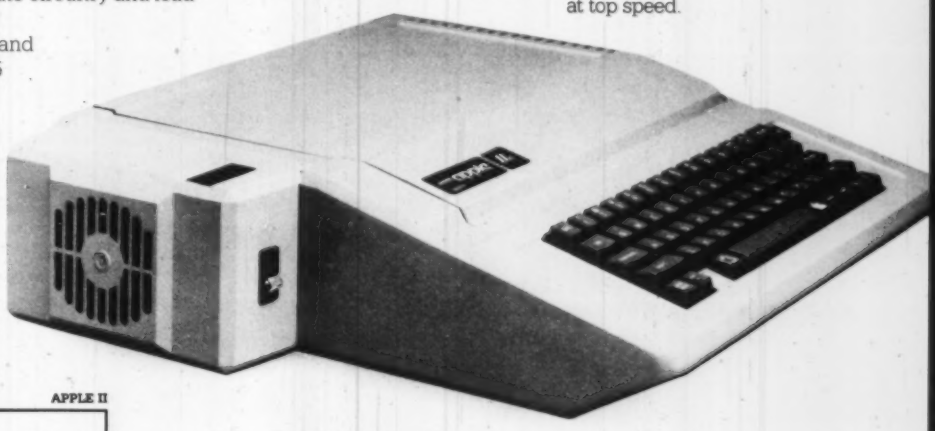

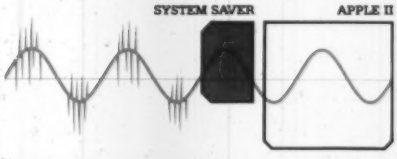

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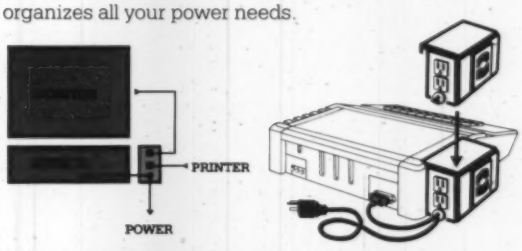
No more reaching around to the back of your Apple to turn it on. No more fumbling for outlets and cords to plug in your monitor and printer. System Saver organizes all your power needs.



It functions as a multi-outlet power strip with two switched outlets. Plus System Saver offers the ultimate convenience; a front mounted power switch for fingertip control of your entire system.

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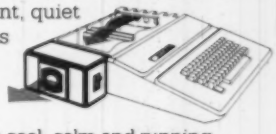

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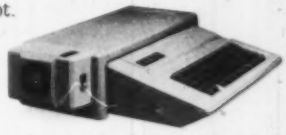

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In this position, they were opposed by the MOE and the U.S. government who pointed out that programs were works of authorship and that the rest of the world including Japan, was generally applying copyright law to program protection. The U.S. also noted that if the MITI Bill were passed, Japan would be in violation of the Universal Copyright Code and the Berne Convention. In that case, the U.S. would probably take remedial action including not allowing the Japanese programs U.S. copyright protection and embargoing imports containing U.S. pirated software. After much bureaucratic jockeying, both bills were withdrawn. But in effect, the Japanese courts are still applying copyright protection.

A similarly tangled set of interests surrounds the communications satellite industry in Japan.

VANs, software, and satellites, indicate an apparent lack of homogeneity in Japan's approach to high technology electronics. The objective of moving into the information age is generally agreed on. But the how and the role of the government, and more specifically each ministry or firm, have yet to be resolved. So far it appears that no one agency or group of businesses will have such control. Japan Inc. seems to be unbundling, with each group representing its own interest and generating only moderate pressure for a consensus.

Japan Inc. seems to be unbundling, with each group representing its own interest and generating only moderate pressure for a consensus.

On the other hand, where MITI's influence is clear, as in the case of the Fifth Generation and Supercomputer projects, resources and research are being mobilized. This is an impressive effort involving several major firms, including NTT, to leap-frog current technology and U.S. market competition.

One interesting objective of this project is the automation of software production, substituting hardware and capital (Japan's strengths) for software expertise (the current advantage of the U.S.). Such factor reversal is, of course, a classic competitive response to a specific advantage. (In the 19th Century, the power loom was invented in response to a shortage of weavers that in turn resulted from the invention of automated spinning equipment.)

Given the importance of the information processing and data transmission business to the future of both Japan and the U.S., the ebb and flow of U.S. and Japanese policy and competitive response is important to everyone. To understand how this dynamic is evolving, however, requires a more detailed analysis of Japanese interest groups and the positions of concerned ministries. It is no longer sufficient to look only at MITI and its industrial visions, other groups are now playing major roles. 完

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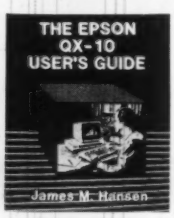

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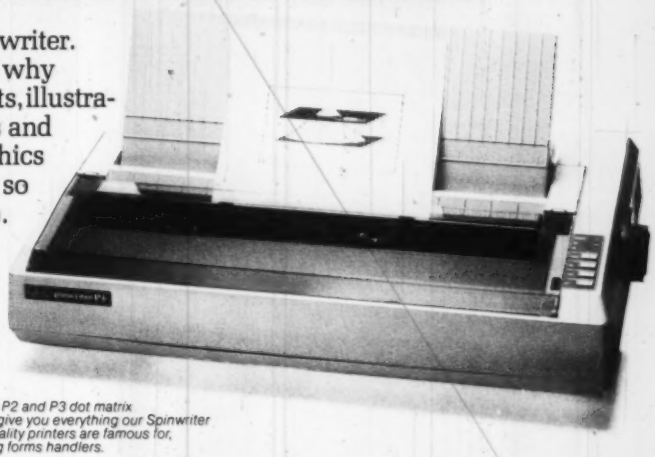

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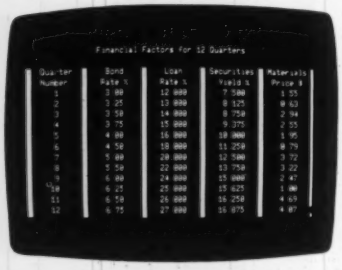

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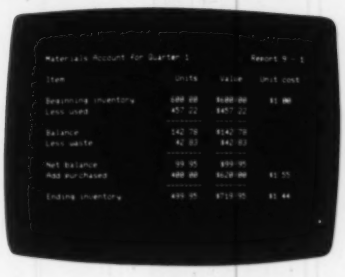

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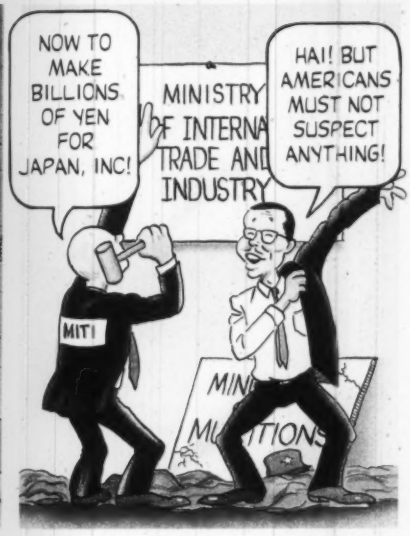
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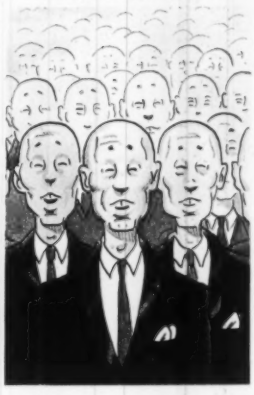
MYTH #2: MAKE CHEAP STUFF SO THEY THINK JAPANESE HAVE CHEAP WAGES AND LIVE LIKE ANIMALS...

MYTH #3: DRESS ALIKE IN DULL BLACK SO THEY THINK JAPANESE ALL CONFORM TO MEDIOCRITY...



MYTH #4: PUT HIGH TARIFFS ON IMPORTS SO THEY THINK JAPANESE CAN'T COMPETE IN FREE MARKET...

MYTH #5: DUMP EXCESS STUFF AT LOW PRICES SO AMERICAN LABOR UNIONS & POLITICIANS FOCUS ON NEW LAWS INSTEAD OF HIGH TECH R&D...

MYTH #6: CO-OPERATE WITH AMERICANS ON S.E. ASIA DEFENSE (AS LONG AS IT'S THEIR MONEY) SO THEY DON'T REALIZE THERE IS AN ECONOMIC WAR GOING ON...

MYTH #7: PLAY GOLF AND BASEBALL SO THEY THINK JAPANESE WASTE TIME LIKE AMERICANS...

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IT WORKED !!
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IT WORKED!
HA! NOW HAVE 95% OF WORLD WIDE VCR MARKET!
IT WORKED !!
HA! NOW DOMI-NATE 64K RAM CHIP MARKET AND HAVE LEAD ON 256K MARKET!
IT WORKED!
NOW HAVE OVER HALF OF WORLD-WIDE MARKET FOR COLOR TV SETS!
IT WORKED!!
HA! NOW TOTALLY CONTROL THE NOTE-BOOK COMPUTER MARKET!
MITI
IT WORKED!
NOW #1 IN ASSEMBLY LINE ROBOTS!
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THE YEAR 2000...
IT WORKED !!
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HA! TOTAL TECHNOLOGICAL SUPREMACY!
HA! BIG-GEST GNP IN WORLD!
HA! HIGHEST STANDARD OF LIVING IN WORLD!
HA! AND AMERICANS STILL DON'T KNOW WHAT HAPPENED!
THE END?

Japan and the U.S.: The Conflict

日米葛藤の関係

S. Reisman

Necessity is the mother of invention. And in the Western World, typified mainly by the United States, creativity is the seed and motivating agent of necessity. And the necessity is individual personal success. Japan is different. The necessity in Japan is societal harmony, and this necessity, as in the United States, is a function of the land, its people, and their history.

As a Canadian living in the U.S. for the last few years, I have had an opportunity to work with corporate America. Coincidentally, and simultaneously, I have also been fortunate (or unfortunate) to work both with and for corporate Japan. These circumstances have provided me with the occasion and environment to observe and compare the two cultures as they operate within the computer marketplace. And let me state at the onset, that though my perspective as a foreigner could be objective, my assessments are by no means so. I readily admit to a subjective perspective favoring Western business styles.

Cherry blossoms are revered in Japan for their fleeting beauty.

In the discussion that follows, I intend to present my opinions regarding some key differences between basic American and Japanese behaviors. Additionally, I will attempt to examine, in a very global sense, some of the causes of these differences. My purpose in doing so is simply to provide interested readers with additional insight which might be used to their advantage at the negotiating table.

The Entrepreneur vs. the Technician

American culture, and by extension business, is characterized by entrepreneurship. To operate as a businessman in America, one must be able to assess quickly all manner of data, to make deliberate decisions, and to act on those decisions. A successful businessman is one who can make a unique decision and proceed to capitalize financially on it. The computer industry is filled with success stories which have followed this model. T.J. Watson, who established IBM, was one such businessman. Other notables in this group include Bill Gates of Microsoft, Seymour Rubenstein of MicroPro, and Mitchell Kapor of Lotus. The ingredient common to all these men is their ability to be creative in assessing a particular marketing requirement, acting on the assessment, and ultimately, generating large financial returns from their products.

In a more general sense, these men illustrate the approach Americans have to tackling most life situations. From the Pilgrims through to the pioneers who tamed the Wild West, up to the space program, Americans have constantly exhibited creative characteristics that have resulted in success.

The very traits that generate success in America are scorned in Japan.

Japan, on the other hand, is very different from the United States. Unlike the United States, the Japanese culture has been thousands of years in development. Unlike the United States, Japan is geographically restricted. Unlike the United States, Japan's population is constricted by its geography. Like other island peoples (notably the British), the Japanese are fiercely chauvinistic—at times almost to a state of paranoia.

Because of such characteristics, Japanese society has evolved in a fashion entirely different from America. The very traits that generate success in America are scorned in Japan. For example, new expressions of art, music, and science are

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strongly encouraged in the United States. In Japan, however, new expressions in these areas are rare. Instead, the Japanese seem to focus on perfecting, sometimes pedantically, already perfect products and processes. An example of this can be seen in the fine skills developed over the centuries, in the growing and careful manicuring of Japanese gardens. As strange as this example might seem at first, I believe that it represents an important difference between the two societies.

In Japan, where land for decorative gardening is in short supply, gardening skills have focused on the development of finer, and ever finer, Japanese gardens. And today, many Americans take pride in gardens cared for in the U.S. by expatriate Japanese.

American gardens on the other hand, when tended by Americans, rarely display the skill and artistry of their Japanese counterparts. American gardens are large, expansive, and colorful—a reflection of the availability of land as well as the extroverted and, more important, creative nature of Americans.

Opportunities for Creativity

Another important and often discussed issue which clearly is different in the two societies is the place of the individual. In a small, physically limited environment like Japan, it is essential for there to be an orderly, harmonious movement of the population. Unless the society is in complete physical, mental, and emotional harmony, that confined population would be in chaos. Through centuries of development, Japanese society has evolved to a state of relative harmony. To maintain this harmony, foreign influences, which might disrupt the orderly daily activities of Japanese life, have historically become restricted. To the outside world, this has sometimes manifested itself as arrogance toward all non-Japanese and as high trade and cultural barriers.

The need for Japanese society to move in harmony has generally meant that every individual in Japan has a responsibility to maintain that harmony. Consequently, each Japanese person develops a sense of belonging to the whole, and that whole is, to him, more important than expressions of individualism or independent creativity.

From another perspective, and one that is, perhaps, somewhat more charitable, opportunities for creativity are also much different for citizens of Japan than they are for Americans.

Creativity does not take place in a vacuum. A few years ago, an "executive toy" intended to foster creative decision making became very popular among middle and upper managers. The toy, which was itself a very creative product, was a rotatable plastic sphere about 5" in diameter. The sphere could be placed on the corner of the manager's desk beside his penholder or quartz calendar/time desk clock. The sphere, which was hollow, contained hundreds of small slips of paper, each with a different word printed on it.

When the manager sat at his desk, considering new projects, solutions to problems, etc., he was supposed to rotate this sphere so that when he stopped, one of those random printed words would appear in a small transparent window which was part of the sphere. Contemplation of that random word in the context of the problem under consideration was supposed to help the manager factor into the range of possible solutions, a new variable, one which in his own experience-set might not otherwise have arisen. The sphere acted as a source of new input to the creative process.

Frequently, creativity does take place in this fashion. Usually though, it occurs somewhat less deliberately than through the use of devices such as the sphere. In the United States and in the West in general, where societal order is less regimented than in Japan, random stimuli and excesses of individual human behavior in either a positive or negative sense are more the norm. Constant changes in American life provide a well fertilized environment for the generation of new ideas—that is, for creativity.

Constant changes in American life provide a well fertilized environment for the generation of new ideas—that is, for creativity.

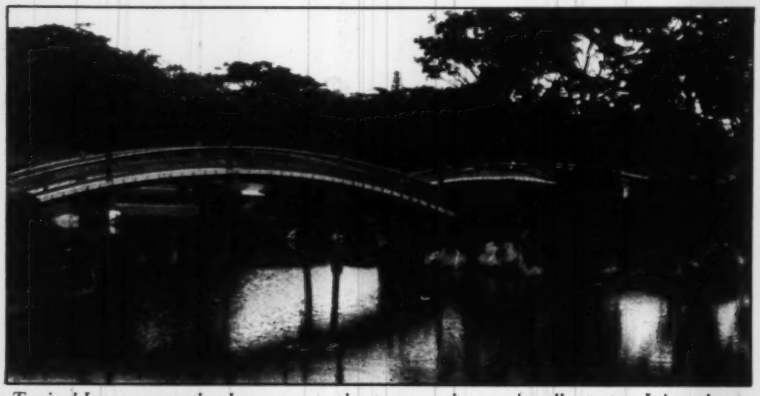
A Land of Entrepreneurs

Finally, returning to the concept with which I began this thesis, I must touch upon the relationship of creativity to invention and the substantial differences between the two cultures in this regard.

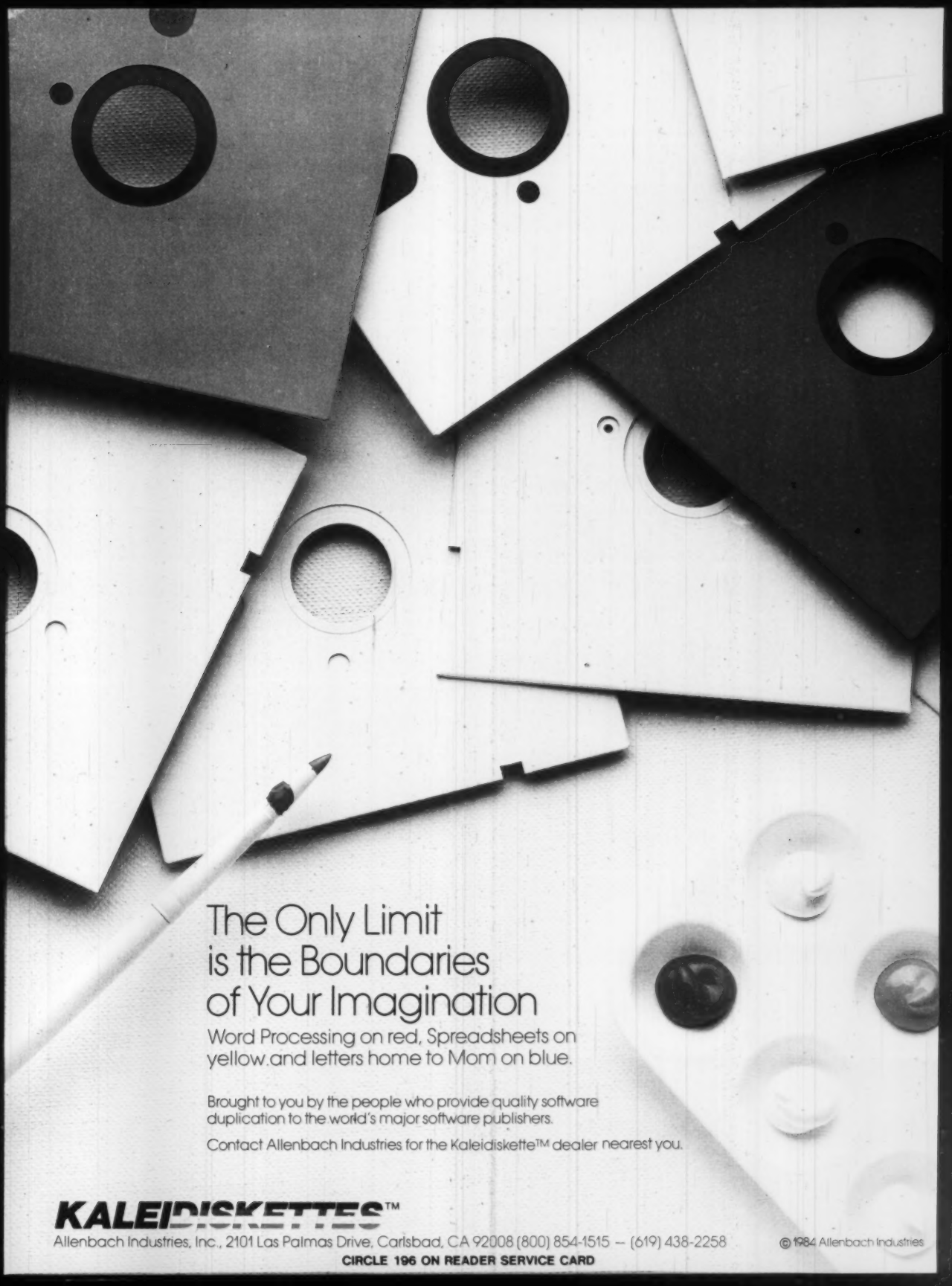
As I stated previously, America is a land of trailblazers—both on Earth and in space. It has become a land of 225 million independent entrepreneurs, most of whom want to achieve wealth, fame, etc. America is probably the least socialized Western country.

Pensions, health care, education, and a variety of other services are available in the United States, both as private offerings and from state and federal governments. However, the preponderance of private offerings is astounding compared to Canada and most Western European countries. Privately offered health and education, for example, is costly but the quality of these is usually higher than equivalent public services.

This is a country in which every person is a businessperson and every citizen a customer. It is also a country in which



Typical Japanese garden has grass, rocks, trees, and, occasionally, water. It is a place for reflection, so rarely are there any flowers to detract from a meditative state.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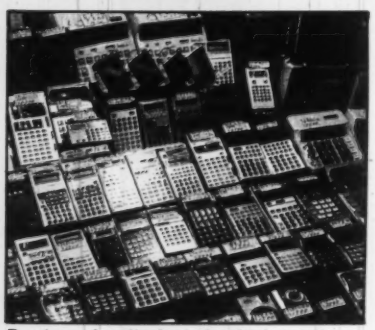
Akihabara district in Tokyo has more than 250 shops dealing exclusively in electronic equipment, electric appliances, and parts.



Portion of a display of calculators in an Akihabara shop.

each person is responsible for his own fiscal circumstances. Consumer laws and government guidelines are minimally available. Justice for those who are taken advantage of is also available—but usually in the courtroom.

In a sense, though the United States is probably the most moral and justice oriented country in the world, there is very little preventive "justice care." And even the justice system reflects the entrepreneurial nature of American society. But, for those persistent enough, justice can ultimately be squeezed from the overcrowded American judicial system.

This is so much different from other Western countries in which the court system is usually the last resort to obtaining justice. In most of these countries, consumer laws at every level of government have been designed to protect the individual from the wiles and guiles of adventurous and creative businessmen. And at the same time, those very laws, guidelines, and rules, to one degree or other, restrict the creative energies of those businessmen.

In a simplified sense, it is precisely this set of American attributes—the set that does not discourage innovative and creative thought processes—in any part of society, that has resulted in America's leading the world into and through the Twentieth Century. This leadership manifests itself as a national characteristic when, in reality, it is the consequence of the success of individuals—individuals who often attain international recognition through their own creative activities.

Japan is very different in this regard. As I described previously, Japan is, overall, a society in harmony. To the Western eye, the teeming flow of humanity, the apparently reckless traffic patterns, and the sensory barrage of fluorescent lights in the Akihabara district seem to contradict this harmony. These manifestations are disharmonious to the unconditioned Westerner for whom these sights and sounds are foreign and unfamiliar. The apparent lack of harmony is reinforced for the foreigner by the strange sounds of the Japanese language and the unrecognizable *kanji* on the street signs.

But on closer examination, order is present. And at least to the individual Japanese citizen, harmony is also present. The Japanese transportation system carries incredible numbers of passengers with extraordinary punctuality. Automobile accident rates, while high even for Japan, would be of battleground proportions in the United States if we were to implement Japanese driving mores. Crime rates in Japan are exceptionally low when compared to the United States. And if you factor population demographics into crime rate statistics, violent crime in Japan is essentially non-existent.

Societal pressures to conform in Japan are extraordinary. Justice takes place at every level of society—within apartment buildings, neighborhoods, and corporate environments. The pressure to conform is never ending. Even physical pressure to conform is overwhelming. As evidence, I challenge you to attempt to *leave* Tokyo on a morning train when commuters are arriving in the city. New York's Grand Central Station is a rural trainstop by comparison.

Societal pressures to conform in Japan are extraordinary.

In this society, there is simply no place for individual self-expression. It upsets the harmony. It is disruptive to established societal behaviors and even day-to-day lifestyles and activities. In short, Japan is a well oiled mass society with rules, patterns, and laws which are in place for the purpose of maintaining the status quo. Japan cannot afford to encourage individualism. It cannot allow widespread entrepreneurship in the American sense. And, as a consequence, it is not a breeding ground for creativity.

And herein lie the essential differences between Japan and the United States. Japanese business activity reflects a highly organized mass society which

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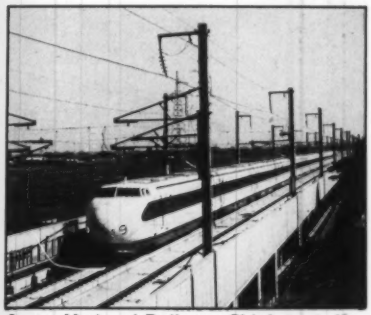
does not encourage individual self-expression and creativity. American society is largely entrepreneurial in nature and rewards successful individual creative achievements. To the Japanese, American creativity in its early stages often appears to be disorganized and unjustifiably risk-taking.

To Americans, Japanese self-control and pensive consideration of issues, often appears to be time-consuming, an overly conservative business tactic, and a behavior which allows opportunities to be missed.

Finally

A basic understanding of the differences between the American approach to business and the Japan approach is essential in the 1980's. There is little likelihood that they and we will reduce our business interactions. Increased flow of goods between the countries is inevitable, and more frequent joint ventures are likely. In either of these situations, we Westerners will find ourselves with more opportunities to work with and for Japan, Inc.



Japan National Railways Shinkansen line train (the so-called bullet train) has a service speed of 130 mph. (Hitachi)

We must enter such relationships fully aware of the vast behavioral differences which separate us. Only through such an awareness will we be able to capitalize fully on the opportunities that present themselves to us and thus to optimize our return—either personal or financial.

完

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The most popular new word-processing product introduced for the Apple computer in 1982 was not a word processor — it was the SENSIBLE SPELLER IV proofreading program.* A perfect complement to your current Apple word-processing program, the SENSIBLE SPELLER IV is fast, friendly, and gives you the features you need in a spelling checker.

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*April 1983, Softalk magazine reader survey.

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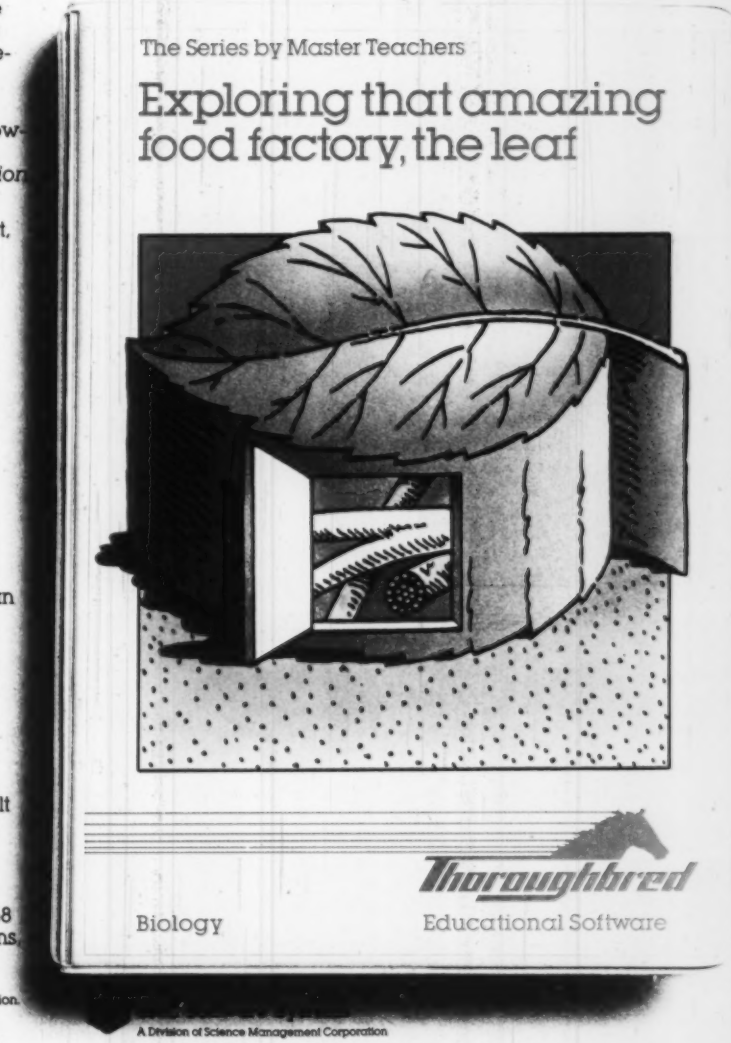

A Division of Science Management Corporation

CIRCLE 159 ON READER SERVICE CARD

Women's Rights? Not In Japan

日本女性に権利はあるか

David H. Ahl

Although most colleges in Japan are open to women, a degree for them has little meaning—fewer than 30% of Japanese companies will even consider hiring a female college graduate. In the other 70% of the companies, the jobs open to women are typically assembly line workers, secretaries, and clerks.

Good penmanship, physical attractiveness, and manners are valued much more highly than knowledge or intelligence. "Office ladies," or OLs as they are called in Japan, who have a good penmanship are much in demand by senior managers who gain much face with a neat letter or report. And for serving tea or coffee to guests, it is desirable for an OL to have a polite, attractive, and charming disposition.

Many companies arrange to have teachers come in to give lessons in a wide variety of subjects including flower arrangement, the tea ceremony, and even cooking. This is one of the few fringe benefits for women. Since the company knows that the girls will leave when they get married, the company helps prepare them for this inevitable event; in addition, this ensures that girls will not delay their marriage.

The highly admired concept of lifetime employment does not apply to women, and there are no career paths open to them. Young women are expected to work, living at home or in company dormitories, until they get married, usually in their mid-20's. They are then expected to quit work to raise their children full time. At the NEC semiconductor plant in Kyushu, for example, it is expected that 300 young women will enter and leave every year.

A working career is almost impossible for a married woman. When a company moves a male employee to another location, he is not asked whether he wants to go. Thus, the wife must be ready to move with her husband at any time. On the other hand, she will remain behind if the children's needs require it, even if he is transferred overseas for two or three years.

More than half of all housewives eventually return to work after their children grow up and leave home. However, these women generally do not work for large companies, as the office ladies in such companies are expected to be young. Instead, they usually work part-time for a smaller company or service establishment (restaurant or shop). A part-time schedule is important, as the wife must prepare the evening meal for her husband and must also attend to family and household management.

Japanese women do not find this objectionable as they do not seek personal fulfillment through a career. Instead, they get satisfaction in helping other family members achieve success—a husband in his company and children in school.

Women college graduates looking for a career position are rare; most are content to accept a position as an assistant or even an office lady. Those who do want professional or managerial positions usually turn to foreign firms with offices in Japan.

Change Comes Slowly

Japan is trying to introduce legislation to provide equality of employment for men and women so it can ratify a United Nations convention on ending sex discrimination. The government pledged to ratify the agreement in 1980, and ever since, an advisory council to the Labor Ministry has been trying, unsuccessfully, to get consensus for a bill to present to Parliament.

Labor representatives to the council—all women—urged a ban on different hiring and employment practices for men and women. However, both management and public representatives were opposed. They said that companies should only be "obliged to make efforts to treat both sexes equally."

Many companies provide classes for female employees in flower arranging and other traditional subjects.

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No punishment for non-compliance was suggested. Nor were any quotas or affirmative action type of goals proposed.

In a public statement, Labor Minister Misoji Sakamoto said that Japan should proceed "slowly and steadily" toward equal opportunity. "I doubt if it is best to regulate everything by laws," he added. "It is better to promote equality through mutual confidence between labor and management."

Most Japanese women seem to agree with this approach. Even Japanese feminists such as Ryoko Akamatsu, director general of the Women's and Young Workers' Bureau of the Labor Ministry, feel that attitudes are more important than legislation. Said Akamatsu, "Legislation cannot change traditional views and consciousness."

For their part, the managers of most companies are vehemently opposed to equal treatment for men and women. Management representatives to the Labor Ministry advisory council say that the government never should have signed the U.N. convention without having sought public approval.

In Japan, women's salaries are about one-half those paid to men.

Companies have good reason to oppose job equality measures. Today, 39 percent of the Japanese labor force is composed of women; on average, they receive salaries about one-half those paid to men. Moreover, Japan is the only industrialized nation in which the wage gap between male and female workers widened in the decade ended in 1983.

Computers—Harbinger of Change?

The computer industry appears to be one of the few that is welcoming women into the fold. In 1984, for example, Hitachi hired 150 female programmers, up from 40 five years ago. And Shigeru Watanabe, in describing the nationwide Microcomputer Qualification Test, said that for job advancement, "many successful young ladies have proved that commanding a computer is a powerful qualification." In some cases, school administrators encourage the entire senior class (of girls) to take the qualification test.

It seems likely in Japan, even more than in the U.S., that middle and top managers will refuse to learn how to use computers, thus the OL concept may change somewhat. In addition to penning letters and serving tea, OLs will be called upon to use computers. Thus, their work will be at a higher level and, because it is more appreciated, the positions will be upgraded.

In other professions, women are beginning to break in, but the numbers are very small. A few more women every year are entering professions such as law, medicine, and journalism. This may not seem dramatic, but in a nation in which 75 percent of the women are happy with their jobs and 71 percent favor separate roles for men and women, it is. 完

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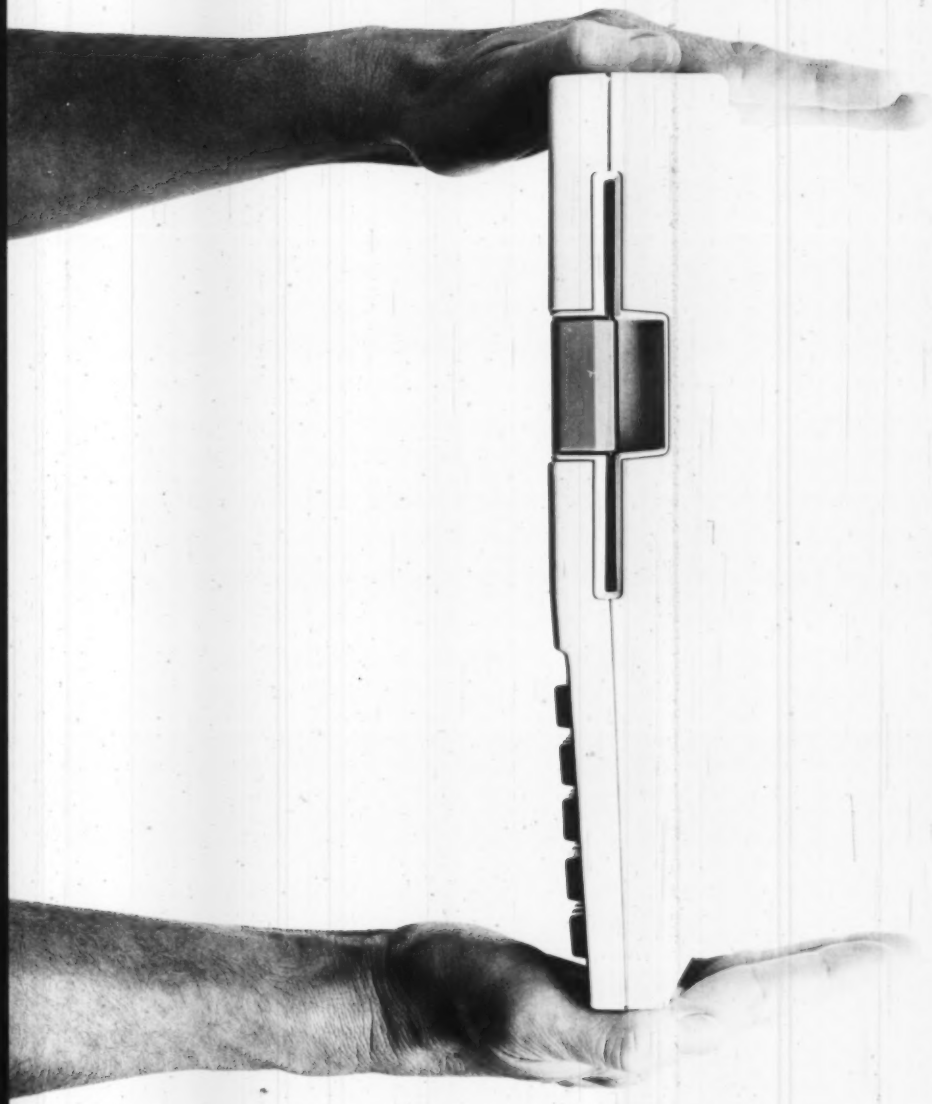
Apple announces a technological breakthrough of incredible proportions.



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IIc
The Apple II
reset
80/40
keyboard
Esc
Tab
Control
Shift
Caps Lock
Delete
Return
Shift

Introducing the Apple IIc.

The new Apple® IIc Personal Computer.

It's about the size of a 3-ring binder.

It weighs less than 8 pounds.*

And costs less than $1,300.**

Yet what it can do is all out of proportion to these proportions:

It can run over 10,000 different programs. For business. For education. Or just for fun.

Which means it can do more for you than any personal computer by any other name. Or, for that matter, initials.

And it can do all that right out of the box.

The Apple IIc comes complete with everything you need to start computing. Including a free 4-diskette course to teach you how. An RF modulator that lets you use your TV as a monitor. And a gaggle of built-in features that cost extra on less senior machines:

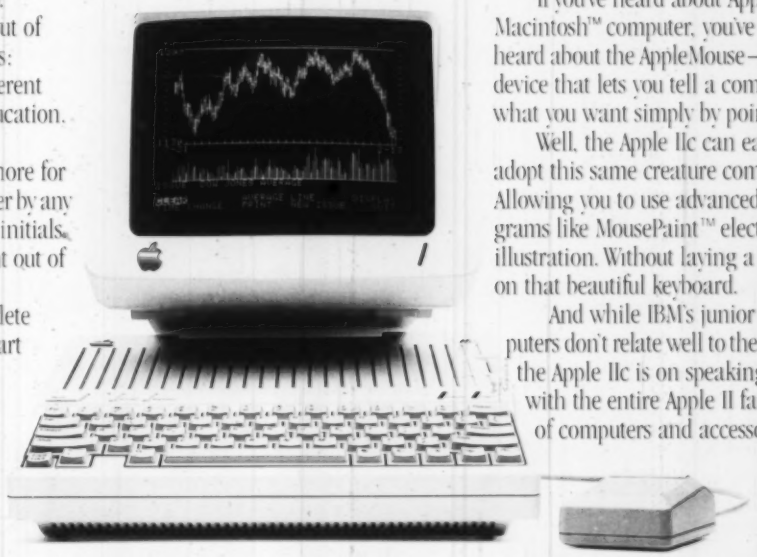
128K of internal memory—twice the power of computers twice its size.

A built-in disk drive that could cost $400 if it weren't.

And built-in connections that let you add printers, phone modems and an extra disk drive without adding $150 goodies called "interface cards."

Its full size keyboard is as ergonomically perfect as an IBM® typewriter's. Which is a lot more than computers by the same name can say.

With full 80-character display capabilities, it can show you more at once than smaller-minded computers.



And with 16 ultra high-resolution colors, it can bring any presentation to life—whether it's a quarterly report or geography lesson.

If you've heard about Apple's Macintosh™ computer, you've also heard about the AppleMouse—a little device that lets you tell a computer what you want simply by pointing.

Well, the Apple IIc can easily adopt this same creature comfort. Allowing you to use advanced programs like MousePaint™ electronic illustration. Without laying a hand on that beautiful keyboard.

And while IBM's junior computers don't relate well to their elders, the Apple IIc is on speaking terms with the entire Apple II family of computers and accessories.

A family known for, among other things, advanced technology, iron-clad reliability and the world's largest library of software.

All of which makes the Apple IIc much bigger than it looks.

*Main unit only. **Suggested retail price.

The first transportable computer worth taking anywhere.

The sad truth is that most small computers are pea brains. With 8 to 16K of internal memory. Displays that look like a jogger's watch. And fewer good programs than Radio Tehran.

The Apple IIc, on the other hand, has more brains and talent in its 7-1/2 pound body than you'll find in some full-size office computers.

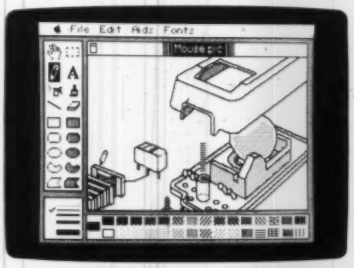
It can run a vast library of Apple II software. Over 10,000 programs.

With a full 128K RAM, it can run advanced business software. Like AppleWorks, a 3-in-1 program that integrates word processing, electronic filing and spreadsheets.

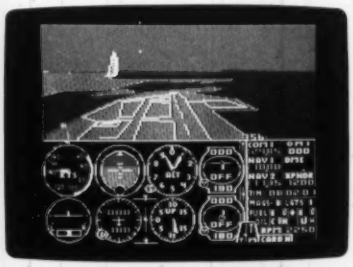
And even as we write this, seventy-nine leading software companies are writing new programs for the Apple II family. Including software that takes full advantage of the AppleMouse.

As a matter of fact, the Apple IIc can do almost everything the IBM PC can, and thousands of things the IBM PCjr can't.

You can add an extra disk

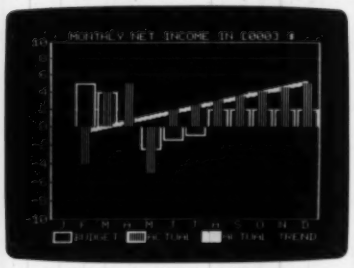


MousePaint Electronic Illustration



SubLogic's Flight Simulator II

AppleWorks Integrated Business Software



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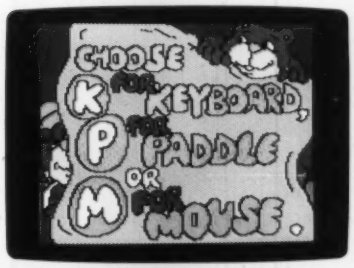
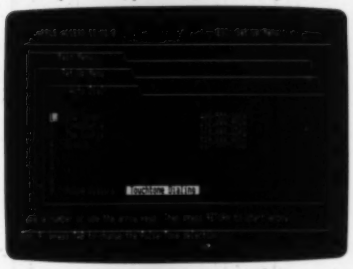
drive so you can run advanced business software for accounting, payroll and taxes.



Stickybear Shapes™ Educational Software



Access II Communications Software

Not to mention specialized software for doctors, lawyers, contractors, farmers, brokers, screenwriters and just about every other profession that's legal.

And, of course, since the Apple II is the most popular computer in all levels of education from grade school to graduate school, the Apple IIc can run more educational software than any other computer in the world, save one—the Apple IIe.

Which makes the IIc the only computer that's as good for your kids as it is for you. And vice versa.

In fact, an Apple IIc can do everything you'd ever need a computer to do, sitting happily on your desk at work or at home.

But if someday you need it to do something in some faraway hotel room, you'll remember what a superb traveling companion it can be.

It can use almost any TV for a monitor—even a hotel TV.

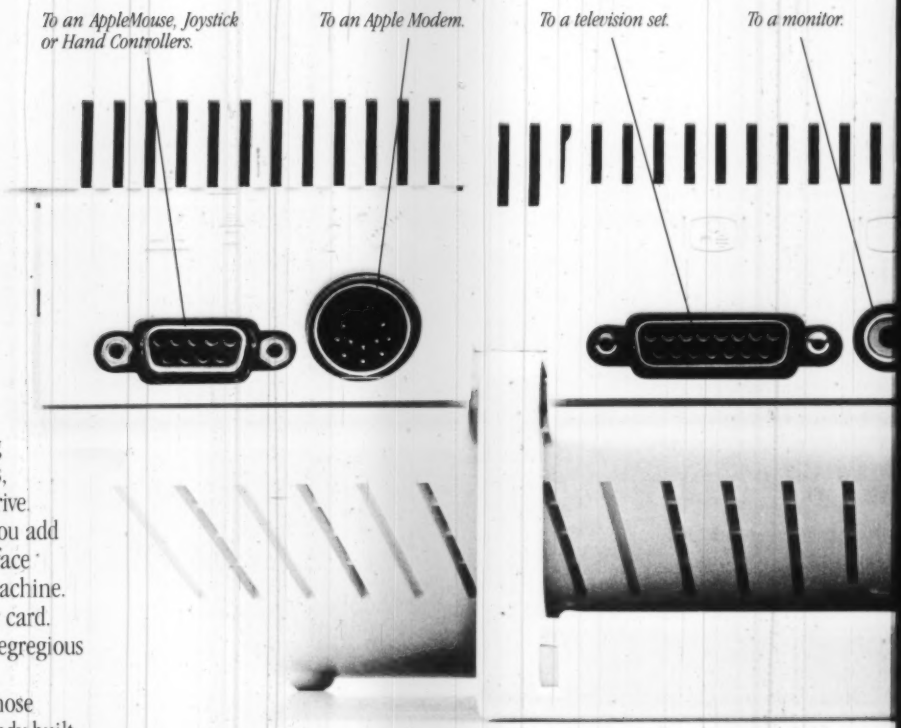
Or you can add an Apple IIc Flat Panel Display†—the very first LCD display that shows you as much information as a regular monitor—80 characters wide by 24 lines deep.

And when your work day is done and you're all alone far from home, it can do one more thing no other portable computer can do.

Play Zaxxon.™

†*Available Fall 1984.*

It gets bigger wh



As we trust we've made amply clear, the Apple IIc comes with everything you need to start computing in one box.

But once you've started, you've got a lot of ways to grow.

Because the Apple IIc comes with powerful family connections. So you can plug in things like Apple modems, printers and an extra disk drive.

With most computers, you add accessories by adding "interface cards" to the inside of the machine. They can cost up to $150 per card. Even more if you make some egregious error installing the card.

With the Apple IIc, all those expensive interfaces are already built in. So you never have to risk messing around inside the computer—it's a sealed system. And the symbols on the back of the machine tell you exactly what goes where.

Which makes growing your system about as difficult as plugging in a toaster.

And which makes outgrowing it virtually impossible.

Displays of graphic power.

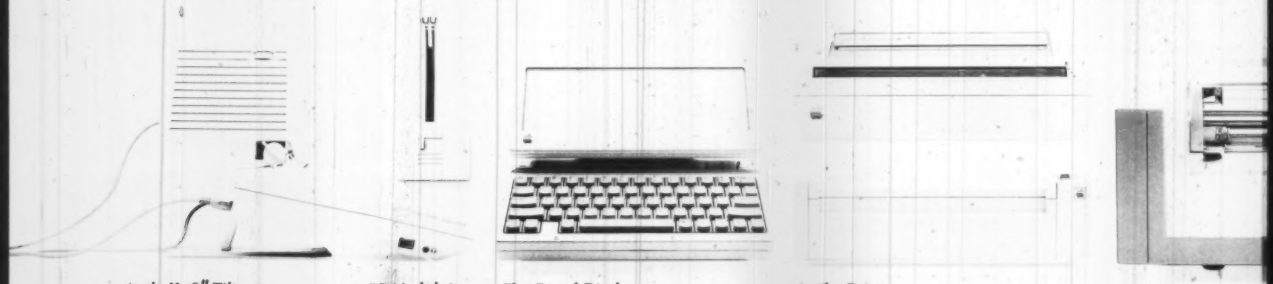
The IIc comes with an RF modulator that turns any garden variety TV into a computer monitor. But you'll get a better picture with one of these:

The Apple IIc 9" Monitor—high resolution green phosphor display that's a perfect match for the IIc aesthetically as well as technically.

The Apple IIc Flat Panel Display—the first LCD display that shows you as much as most regular monitors: 80 characters by 24 lines.

Miracles of reproduction.

The IIc can drive virtually any serial printer on the market—including letter



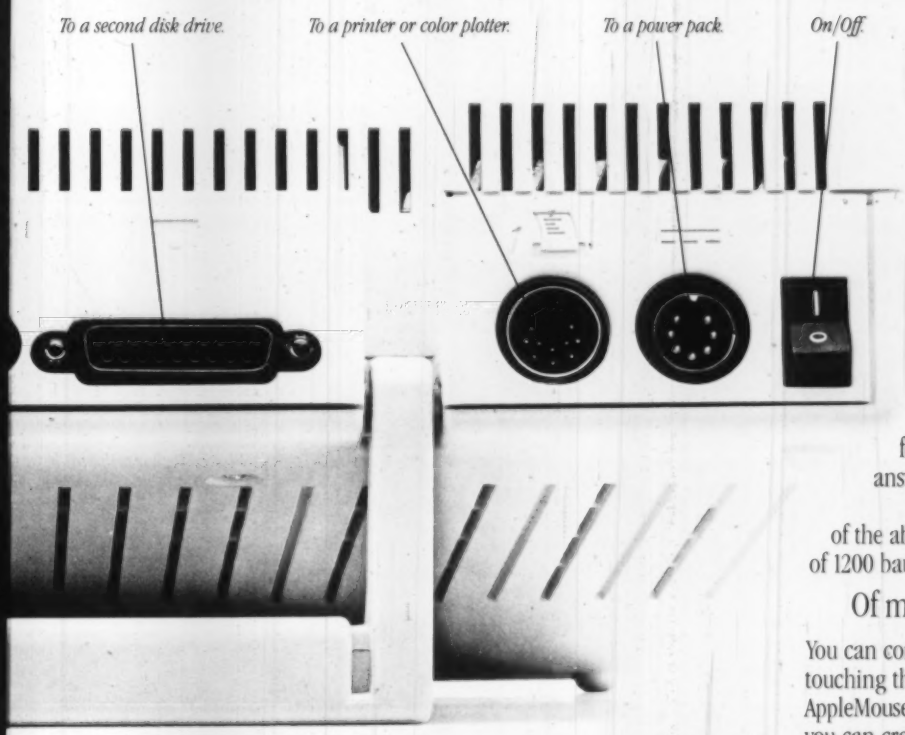
Apple IIc 9" Tilt Screen Monitor

RF Modulator

Flat Panel Display

Scribe Printer
Imagewriter

en you plug it in.



quality for serious business. But we offer two IIc printers and a color plotter that offer you a lot more graphic flexibility:

Scribe—Apple's first ultra low cost quality color/b&w printer. Works with any kind of paper, from bond to plain brown wrappers.

Imagewriter—Apple's high quality printer reproduces most anything you can put on the IIc's screen.

Color Plotter—Apple's incredibly compact wide bed plotter generates all kinds of graphics and illustrations in 8 brilliant colors.

Reach out and beep someone.

Your Apple IIc can give you a direct line to the world. Bank at home, find the lowest air fares, follow the stock market, even buy software and have it sent directly to your IIc—all over the phone. And to do all that, all you need is one of these:

Apple Modem 300—a low cost phone link for your IIc with advanced features like auto dial, auto answer and self-test.

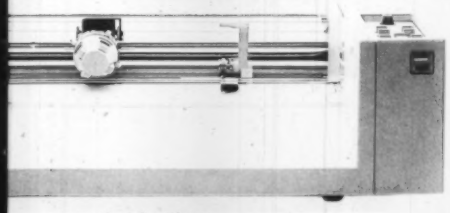
Apple Modem 1200—all of the above plus high speed mode of 1200 baud.

Of mice and joysticks.

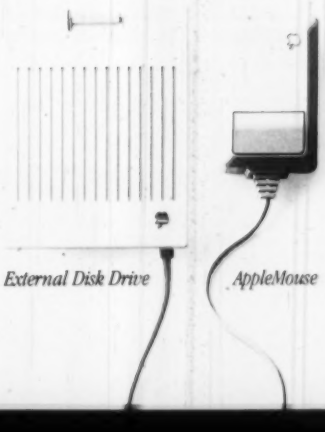
You can control your IIc without even touching the keyboard. With the AppleMouse and MousePaint software, you can create impressive electronic illustrations in color.

The AppleMouse—Replaces complex keyboard commands with point-click-cut-paste simplicity. Comes with free MousePaint program.

The Apple IIc Joystick—a game controller that's also used for many educational programs and music composition.

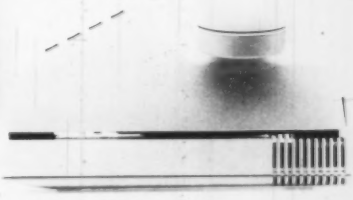


Apple Color Plotter

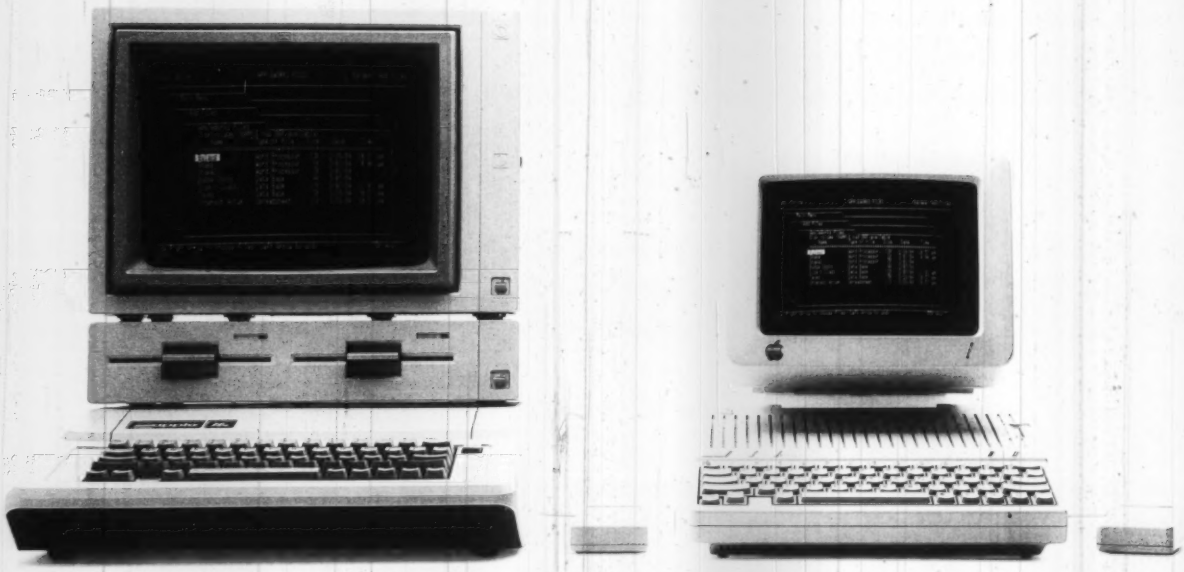


External Disk Drive

AppleMouse



Apple Modem 300/1200



IIe or IIc. That is the question.

We've spent the last seven pages giving you lots of good reasons to take home an Apple IIc.

But we don't want you to forget that our newest brainchild isn't an orphan.

Its father, the Apple IIe, happens to be the granddaddy of the entire personal computer industry.

Unlike we humans, it gets more flexible, more powerful and more innovative every year.

It can run more software than any other personal computer in the world.

There are also more accessories and peripherals for the Apple IIe than for any other personal computer in the world.

You can expand its memory to an elephantine 512K.

You can add a ProFile™ hard disk that can store up to 2400 pages. Room for all the files of a small business. Or an unabridged history of Armenia.

In fact, you can expand the Apple IIe to do just about anything you can imagine.

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Progress and the Japanese Language

Will There Be A Computer On Every Tatami?

日本語 進歩に順応させる

Yasuko Morihara

Language Characteristics

When I say to Americans that English is a difficult language, they always agree. They usually comment on irregular spelling or inconsistent pronunciation. But that is not the hard part. The hard part is deciding even before I open my mouth whether to use a, an, or the; whether a noun is singular or plural; which pronoun to use (especially he or she); what verb tense to choose; and what the subject of the sentence is. A Japanese visitor once marveled that our son who was a little over two years old at that time had already mastered the use of articles and singular and plurals. For Japanese these are the hard parts; we do not have these problems in Japanese.

Japanese does not have articles. Singular or plural is shown by context or specific words, e.g., one apple, three apple, many apple. Why do you need an s? Since pronouns are not often used, we avoid the whole sexist problem in language use, because we do not identify the sex unless it is required. (We do not identify people by hair color either!) The time element in Japanese verbs is not elaborated as much as in English verbs.

Usually the subject is omitted (this also reduces pronoun use). The listener must figure out the subject from the context, e.g., "*Samui* (cold) *desuka* (present form of the *be* verb with no singular or plural distinction)?" If you are facing the person, it can mean, "Are you cold?" or it could mean, "Is it cold?" As a result, Japanese is normally much more vague than English. The listener has the liberty to interpret as he wants. Obviously, this can lead to misunderstandings, but it can also avoid conflict. It is very easy to be ambiguous in Japanese, whereas the nature of the English language makes it much more specific. We can, however, be precise if we need to be.

Most Americans agree that Japanese is also a difficult language, especially when they see the writing. The hard part of spoken Japanese for non-Japanese is not pronunciation—pronunciation is actually easy. All the sounds of Japanese are in English, although we do not distinguish sharply between l and r (you know the rice/lice jokes), f and h, b and v. Like Americans we enjoy the mistakes foreigners make in pronouncing our words. (In my college days one of the most popular chapel speakers was a certain American missionary. He usually pronounced the word *kami* which means God as *kame* which means turtle, so we would hear things like, "Turtle saves us.")

However, the hard part is in the

Japanese computer magazines from ASCII Publishing Co. Magazine name and some headlines are in English; text is a mixture of kanji, kana, English, and Arabic numbers.

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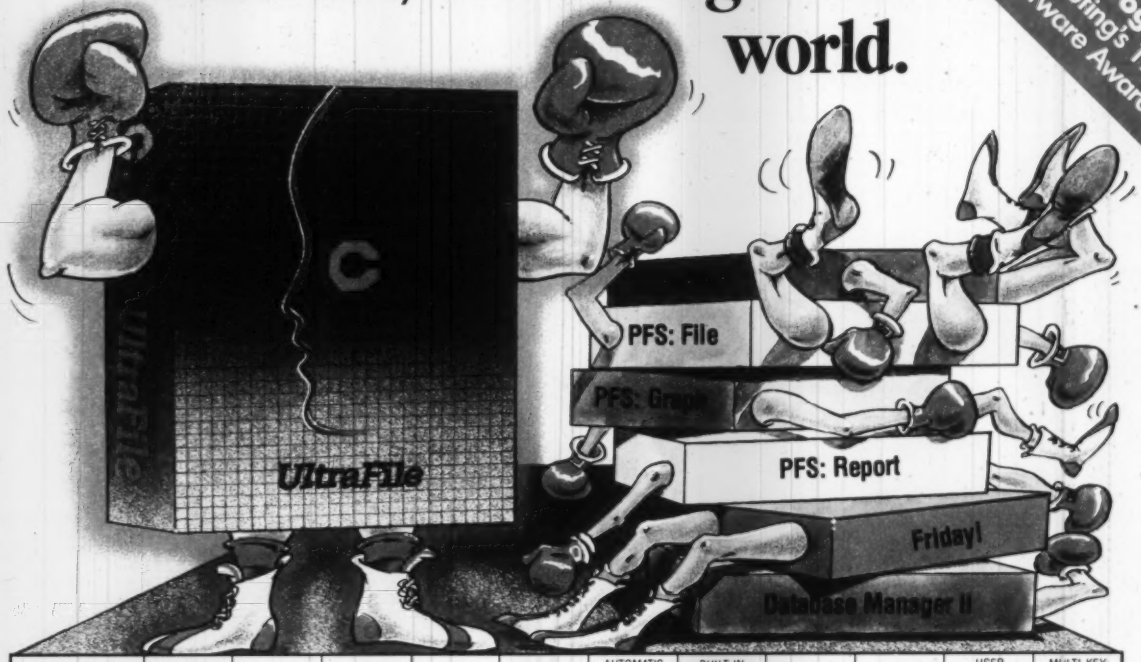

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"speech levels," the use of honorifics with nouns and polite forms of verbs. Before we speak, we must make a careful analysis of the human relationships involved. I must decide what my status in relation to the hearer is, what my relationship to the hearer is, what the relationships to other people we are discussing are. These relationships determine what I say and how I say it.

When men address women, especially their wives, the polite forms are not used.

For example, suffixes are added to names to show these relationships: *-san* to names of peers, *-chan* to children or intimates, *-sama* for someone higher or to show greater respect (e.g., a salesman to a customer). Since I am the oldest in my family, my sisters and brother call me *O-nei-chan*, honorable older sister. In Japanese they never address me by my name, but in English they may, but not without adding *-san*. On the other hand, I can address them all by their names without honorifics.

The verb endings also show these relationships. The polite form of the verb is used to describe the action of the other; thus the hearer knows that it is not the action of the speaker. For example, *ikaremashita* (went) is never to be used for the speaker, for it is a very polite form of went. Therefore, the listener knows that someone other than the speaker went. Women use more of these polite forms than men do, especially when they address men. When men address women, especially their wives, the polite forms are not used.

Misreading a situation can result in great embarrassment, the loss of friendship, and even the making of enemies.

Dealing with New Ideas

At the point of language, Japanese are pragmatic. We know that the Japanese language is difficult for modern use. So instead of trying to translate foreign words, we just borrow them. We adopted German for the medical field (Japanese doctors write their diagnoses in German); Italian for the musical field; English for cultural things (sports, foods, dating customs, household appliances) and all the technological areas.

While we do not hesitate to borrow the foreign words, we do insist on pronouncing them our way. In general, Japanese alternates consonants and vowels. Most syllables and words end in vowels, e.g., *Hi-ro-shi-ma, Yo-ko-ha-ma, I-ke-bu-ku-ro.* So when we borrow English words, we put in the missing vowels, e.g., department becomes *de-pa-to-men-to*. Since English has some sounds that we do not have in Japanese, we make changes, e.g., vitamin becomes *bi-ta-min* and coffee becomes *ko-hee.*

Furthermore, we shorten the words to economize on pronunciations and writing time. It is not too difficult to recognize the way they are shortened: *de-pa-to* for department; *a-pa-to-* for apartment; *ko-re-pon* for correspondence; *pu-ru* for swimming pool; *pu-ra-to* for platform; *bi-ru* for building.

Japanese accepts computer terms from America, but pronounces them in the Japanese way and sometimes shortens them, e.g., *pa-so-kon* for personal computer, *wa-pu-ro* for word processor, *kon-pachi* for compatibility, *pu-ro* for professional, *so-hu-to* for software. A Japanese computer dictionary contains about 8000 terms, the great majority of which are from English.

The Written Language

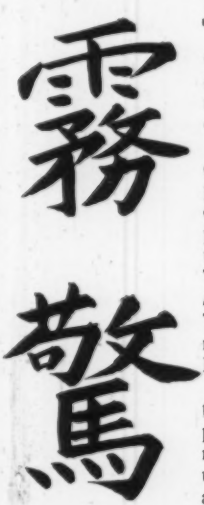
Japan did not develop its own writing system, but borrowed the ideograph system already highly developed by the Chinese. We call these ideographs *kanji.*

The Chinese began by drawing pictures. Over a period of time these pictures were stylized, and the forms were determined by the writing equipment: a brush, ink, and paper. If you see the picture behind the *kanji,* you can understand the rationale for its composition. *Kanji* are combined to represent more complex ideas just as in English nouns and verbs are modified by adjectives and adverbs. Since each thing and idea needs its own *kanji*, the number of *kanji* that must be mastered runs to tens of thousands and requires long training. And of course a living language requires new words, which require new *kanji.*

While the system many seem cumbersome to the Westerner, it does have one very great advantage: it can be totally separated from any spoken language, and thus it can transcend spoken language barriers. As a result the Chinese system was widely adopted in Eastern Asia. When East Asians gather, they cannot speak, but they can communicate through writing.

However, due to the complexity of the characters, simplification is taking place, and unfortunately, each country is simplifying in its own way so the writing consensus is beginning to break down.

Since each thing and idea needs its own kanji, the number of kanji that must be mastered runs to tens of thousands and requires long training.



The top kanji is made with 18 strokes. It means "fog." The Japanese pronunciation is "kiri"; the Chinese pronunciation is "mu." The bottom kanji is made with 22 strokes. It means "surprise." The Japanese pronunciation is "odoroki"; the Chinese pronunciation is "kyo."

When Japan adopted the Chinese characters, it also borrowed the Chinese pronunciations for them. This has caused great difficulty in reading and pronunciation. For example, the *kanji* that means east is pronounced *to* in Tokyo (East Palace) and pronounced *higashi* in *higashi deguchi* (east exit). The *kanji* that means capital is pronounced *to* in Kyoto and *miyako* in Miyako Hotel.

In context we can usually differentiate, but, when a word is the name of a place, a person, or a new product, it is not easy to determine which *kanji* is used. Sometimes both pronunciations are used. So in a conversation we often

clarify a spoken word by "drawing" the *kanji* with a finger. Conversely, when we see a *kanji*, we cannot always be sure how it is pronounced, since many pronunciations are possible.

Kanji could not adequately meet the needs of the Japanese spoken language; therefore two forms of simplifed writing called *kana* were developed in the Ninth Century. There are 52 *kana*, each of which represents a Japanese syllable or phoneme. These permit writing Japanese phonetically. There are two forms of *kana*. One is called *katakana* which is of straight strokes and rather square like print. This is used for writing foreign words. The other is *hiragana* which is very cursive in form and is used to write all the Japanese and Chinese words that cannot be written in *kanji* or for the purpose of writing Japanese poems and novels.

Sample katakana. The top one is pronounced "te"; the middle, "re"; the bottom, "be." This is the Japanese way of writing and saying "television."

Using *kanji, katakana,* and *hiragana,* Japanese can express fully an enormous number of new words, ideas, and information. If you open a Japanese magazine, you will find all three forms used along with untransliterated English words. We do not force new ideas into the mold of the traditional language and try to come up with new *kanji*; instead we add the new words to the base in *katakana* just as English borrows and makes new words to fit into the Anglo-Saxon base. In fact, the government has limited the number of *kanji* for normal use to 1850 which are required for study through high school. A college student may have to learn several thousand more in order to read materials written before the 1850 limit was set.

Sample hiragana. The top one is pronounced "ah"; the bottom, "ru." This is one form of "to be."

Writing and the New Technologies

Writing with the brush was not only a way of writing, but under the influence of Zen Buddhism brush writing became an art form and a spiritual exercise. Proper writing requires the proper spiritual attitude. Calligraphy became highly developed.

Then printing came to Japan, and a typewriter was developed sometime later. Due to the nature of the Japanese language the typewriter never came into the home. It stayed in business use. This does not mean every company and office owned a Japanese typewriter. They owned clerks—mostly female—who had very good penmanship to write and copy the enormous number of letters and documents. When a typed document is required, it is sent out to be typed. Thus, using a Japanese typewriter at home for personal use is unthinkable. Japanese students write by hand all their papers, theses, and dissertations.

You can imagine why having good penmanship is highly praised and envied. However, the flood of knowledge each child must now acquire for the entrance examinations leaves little time for the practice of penmanship, and it is now very rare to find members of the younger generation with good penmanship.

Due to the nature of the Japanese language the typewriter never came into the home.

The computer with word processing may bring a revolutionary change to the business world. Even though the word processor is not yet used in business to the extent that it is in the U.S., once the Japanese companies and offices begin using it, it will be adopted as standard procedure much faster than it was in the U.S. The U.S. still has highly sophisticated typewriters and many people can use them to fill the gap between handwriting and word processing. Japan will skip the typewriter and jump from long hand to word processor.

Once they see the result of a product produced by a word processor, Japanese will never want to go back to hand written documents. When the decision to switch is made, the spirit of willingness to work hard for the sake of the image of the company or institution to which one belongs will make everyone learn how to use the system. The result will be fast.

In the U.S. the typewriter was used in the business world first and then came into the home for personal use. The computer was introduced to the business world first, and now it has entered the home. This pattern is not likely to develop in Japan, at least not as quickly. It is the Japanese language that will make this switch to home use difficult. 完

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Japanese Cramming Schools Leave Little Time for Play

受験地獄と塾

David H. Ahl

More than 60 percent of Japanese junior high school students attended *juku* (cramming schools) last summer rather than having a good, relaxing vacation. Why?

Japan is geared to entrance examinations for kindergarten through the university level. Thus, children study day and night to enter the "right" school. Graduation from a prestigious university generally means attractive job offers from blue chip companies.

Normal government and private schools provide a good, standard education, but *juku* give students an extra edge in the great education examination race. This has resulted in a *juku* boom to help elementary and junior high students prepare for entrance exams to big name schools.

There are also hundreds of *yobiko* (prep schools for senior high students) to help prepare students for university entrance exams. These schools are perhaps more understandable than the *juku* as much emphasis is placed on the university one attends in Japan. Since entrance to a university is based entirely upon a single exam—given only once a year—it is vital to be well prepared.

Most serious high school students would like to attend Tokyo University (Todai), considered to be the school for the future elite. Naturally, Todai can't possibly accommodate all those who want to attend. Thus, certain *yobiko* specialize in preparing students for Todai's exam.

Nearly one-third of all students who attend a university each year have attended a *yobiko*. Students who fail the university exam and enroll in a *yobiko* to help them try again the following year are called *ronin* (masterless *samurai*).

Passing key examinations is the focus of an ambitious student's life. Recently, junior high students in one *juku* rebelled against teachers in their school because they were being taught "irrelevant" subjects such as music and art. The rebels demanded instruction to enable them to pass high school entrance exams, and only that. Music and art were considered "wasteful."

Some concerned Japanese say that there is something wrong with the regular education system if millions of kids must attend *juku* every day after their regular school lets out or during summer vacation. However, one high-ranking Japanese education official put it this way, "*Juku* are necessary in order to get the best out of people."完

Photos: 1. Banner reads "Congratulations on passing Todai exam." 2. Students search for their number on signboard announcing exam results. 3. Typical class at a yobiko. 4. Orientation ceremony for a yobiko with over 10,000 students present.

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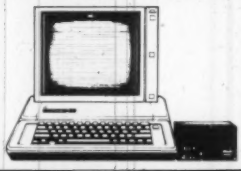

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* Silicon Valley, Word Handler		$ 60	$ 39
* List Handler		$ 50	$ 33
* Handler Pak (Word, List & Spell)		$ 130	$ 85
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100 ea. DS/DD, 40 Track (IBM, H/P)		239
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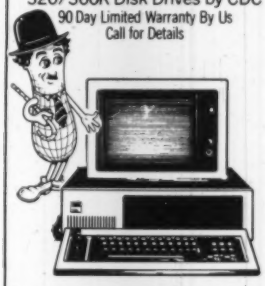

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Japan and Technology: A Nation Looks to the Future

日本と工業技術・将来に目を向ける国民

Tim Onosko

Sometimes, in Tokyo, it is difficult to understand how Japan can have the reputation for being a technologically innovative nation.

For one thing, everyone in the city gets lost. Lifelong residents still stare at maps in subway stations trying to find their way home. Ask a cab driver directions to a certain place and he may scratch his head or consult, at length, an encyclopedia-sized book of detailed maps. No small wonder. Tokyo, one of the largest cities in the world with over 12 million people, has almost no street signs. And, to add to the confusion, buildings are numbered in chronological order.

Looking at Tokyo's mass media, one wonders what happened. The number of television stations is comparatively few, with the public NHK network (Japan's version of the BBC) dominant. There is no cable television, except from a recently formed company which services primarily hotels. As for radio, the capital of the country which makes the vast majority of FM radios for the world has only two FM stations, itself.

But these examples only confuse an already muddied picture. Japan is a nation looking to the future and actively planning for it. It is a skyrocket with the fuse lit, waiting for ignition. Sometimes, to us in the West, only the sparks of that fuse are visible, obscured by misunderstanding and lack of information.

We can learn only as much about Japan by reading as would be possible to learn about the United States from *Time* or *Newsweek*. That is to say, little or nothing. But we can begin to understand the *direction* that Japan is taking by looking at rapidly emerging trends and observing the nation's attitudes toward technology.

Japan has a population of 117 million people, or about half that of the United States. Because of the bombings during World War II, much of it has been rebuilt. (It is still difficult to come to grips with the fact that Japan is the only place on earth which has had a nuclear weapon used against it.) As one would expect, much of Japan is ancient and traditional. Much less expected, however, is the modernism of contemporary Japan, and especially Tokyo.

Tokyo is nothing short of an eye-opener for Americans. It is a city that "works," unbelievably clean and functional. It is as manic as, say, New York City, but there seems to be a keener sense of direction and purpose among the populace. As any world capital, it attracts visitors from around the globe, and the best of world culture is on display. Unfortunately, for all of its reputation as a cosmopolitan city, there is little

Marunouchi area east of the Palace grounds is one of the major centers of business in Tokyo.

Tim Onosko is a widely published freelance writer specializing in computers, holography, robotics, and other high technology topics. He is a frequent contributor to Creative Computing.

cultural or ethnic diversity in Tokyo. This is not the "melting pot" of New York, with its immigrants of many different ways. Of Tokyo's millions, only a tiny percentage are not Japanese.

Because all of Japan is, in so many ways, a cultural monolith, the national characteristic most often cited by Westerners is the great unity and force with which Japan approaches the world market. Much has been written about the *samurai* style of business, for example, and Americans sometimes tend to think of industrial Japan, not as a group of industries that are as competitive with each other as they are with the rest of the world, but as some sort of army. Blue suited executives at the rear, directing hordes of uniformed workers, marching, marching in time.

Less attention, however, has been paid to another aspect of Japan's unity—its plans for the future. Japan is already bursting with people and lacks space. It is almost completely dependent on foreign sources for its energy requirements and has few natural resources other than the sea that surrounds it. Yet, in the last two decades it has become so heavily industrialized that practices Americans only talk about—careful resource management and long-term planning—have become a necessity. Japan is, at least, attempting to establish national policies with regard to technology and its increasing impact. Government has taken the strongest lead in their formulation, but industry and labor unions are also involved.

An important policy concerns the effect of automation on the labor market. Auto maker Nissan says that none of its workers will be displaced as it continues to automate its factories. But, with Japan's lifetime employment practices, an aging workforce and new workers entering the market daily, it will be interesting to see how well the policy works. More important, though, is not whether these attempts will be successful, but that they are being made.

Among other plans for Japan's future are its much-touted Fifth Generation computer project, an infant but active space program, the designation of new towns as research centers and production hubs for new technologies (so-called "Technopolises") and places for the application of new communication techniques ("Teletopias").

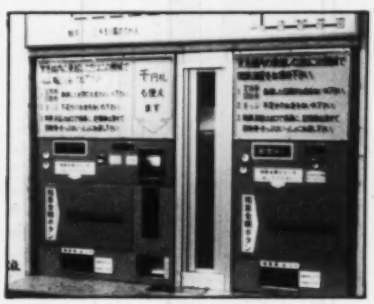
A High-Tech Nation

While it is possible to discuss Japan's *attitude* toward technology and the future by talking about national policies and programs, it is much more difficult to convey the *feeling* of the nation. New technology is pervasive in Tokyo and has integrated itself in a new style on display in design (from industrial design to women's fashion), architecture, and marketing.

Little things tell the visitor about the Japanese fascination with mechanization. Most of the doors in commercial Tokyo are automatic sliding doors. Not that Americans haven't seen them (try finding a supermarket without one), but the automatic door is the rule, more than the exception, in Tokyo. Visitors often look foolish, constantly pushing at glass doors which suddenly slide left. Conversely, said one young Japanese woman: "When we go to America, we stand in front of doors, waiting for them to open."

There are new embellishments to the sliding doors, as well: Digitized female voices greet customers to business establishments with a variety of salutations, then thank them politely as they leave. The voices add to the already cacophonous Tokyo business scene and will undoubtedly find their way into the tens of thousands of streetside vending machines which offer whisky, cold beer, and hot sake, in addition to more conventional fare like cigarettes and coffee. Automatic bank teller machines, not uncommon in the U.S., have been restyled for Japan. On tiny color video monitors, many of the bank machines display a computer graphic image of a woman who bows to thank the user for his transaction.

Since so much of daily life is mechanized in Tokyo, it shouldn't be surprising that the robot has become a powerful symbol for the future. Robots can be found everywhere, from children's television programs and toys—the intriguing, modular warrior robots now catching on in this country—to subway station advertisements for department stores and special events. The robot, of course, is a major force behind the increased industrial productivity of Japan and symbolic of automation in all work areas. It has also, however, become a friend and the mascot of the 1980s.



All tickets in Japanese subways are dispensed by machine. There are no human attendants at all so if you can't decipher the Japanese characters, you're in trouble.

Auto maker Nissan says that none of its workers will be displaced as it continues to automate its factories.

Robots Everywhere

Namco, Japan's leading video game company, which introduced Pac-Man to the world, is very much interested in robots. It is already producing a line of entertainment robots which show up in shopping malls and other public places. These function simply, from demonstrating a machine's ability to learn its environment and maneuver a maze, to vending souvenir stamps and eliciting howls of delight from children with their mechanical comedy. Current favorites include a robot circus, cartoonish characters from Namco video games ("Mappy"), and "Cosmo Hoshimaru," the mascot character of the 1985 world's fair.

The Namco robots are not yet autonomous; they must be preprogrammed or controlled via radio. The company holds hope for their latest joint venture, however, a working agreement with Dainichi Kikko, said to be one of the brightest and most innovative manufacturers of industrial robotics. The mind reels when considering the possibilities of combining state-of-the-art robotic techniques and principles of artificial intelligence with Namco's knack for high tech entertainment.

Robotics are going home with the Japanese, as well. Several lines of small robot hobby kits are widely available in toystores and hobby shops. "Movits"

demonstrate ideas of numeric control and feedback in tiny turtles and walkers constructed from hundreds of plexiglass and metal parts. Bandai, a leading toy manufacturer, has its own line of "Tectron Sensor Robos" which, while not as smart as the Movits, feature incredible mechanics. One of the Sensor Robos is named "Monohopper," and is a clever demonstration of a one-legged, inertial movement system.

It may be difficult, in the near future, to distinguish between toys and tools.

Tomy, Japan's other toy giant, discovered just how popular robots were when it introduced "Ki-Ku-Zo," a 13" tall android last December. Supplies vanished literally as fast as they could hit the stores. The reason? The $50 Ki-Ku-Zo is a voice recognition robotic pet which can be trained by the owner's voice to walk around, pick up and deposit small objects. It was developed by Tomy's research and development staff in conjunction with Matsushita Electric, the nation's largest electronics conglomerate. (Another voice-response toy, an LCD hand-held game called "KO Boxing" from Gakken, is enjoying similar success in the Japanese market.) Tomy plans to follow its success with Ki-Ku-Zo by introducing a robot "butler" this year, and both devices are destined for the American Christmas market.

It may be difficult, in the near future, to distinguish between toys and tools. Already, Dainichi Kikko's industrial robots have been displayed at the Seibu department store in the Ikebukuro district of Tokyo. Not quite something you'd come home from a shopping trip with, but this demonstrates how technology is being marketed in Japan.

Shopping for Technology

The traditional method of marketing technology is typified by the mania of Akihabara, the electronics and electrical district of Tokyo. Here stores range from modern, multi-story consumer electronics emporia to a labyrinth of tiny stalls where merchants hawk their wares (including the most advanced microchips, coveted 256K RAMs). Most storefronts are open to the street, merchandise spilling out onto the sidewalk. Almost all are loud, garish places which offer price and value over elegant settings.

Akihabara is the very best place to get a feeling for the *range* of products spewing forth from the high technology industries. Americans are often stunned at how few of these are exported to the U.S. Some products are developed for relatively small market segments. Akio Morita, the legendary president of Sony, personally instigated the development of a Trinitron television set which can flip its picture to a mirror image. The intended customers? Proprietors of Japan's 300,000 barber shops, whose patrons watch TV reflected in mirrors.

Akihabara is the old way. Tokyo also has two of the best examples in the world of new stores for technology and electronic media. The first is Wave, a stylish "media store" in the fashionable Roppongi district. Wave is owned by Seibu, a large corporation specializing in leisure and fashion businesses, including hotels (the Prince chain), department stores (Parco, the most chic retail development in Tokyo), golf courses, driving ranges, amusement parks, resorts, a baseball team (the Seibu Lions, 1983 Nippon Champs), and a subway line. Seibu is also an arbiter of taste, importing foreign (i.e., American) films to its art cinemas and promoting concerts and shows.

Wave is the store of the future, selling mass media—the printed word, recorded sounds, and electronic and video software—in a design-conscious setting. As expected, there are racks and shelves filled with merchandise, but scattered amid its grey interior are dozens of video and computer monitors. Some of these play abstract video art and film. Others, in kiosks, are for previewing rock videos. (The sound is furnished via Walkman-style phones.) Still others play interviews with authors, filmmakers, and musicians filmed especially for the store. Computer terminals are linked to a database for searching Wave's stock of sound recordings. The top two floors of the building, appropriately, are occupied by the offices and studios of a computer graphics firm.

Wave is more than a fashionable book and record shop, however. It is an *information store,* perhaps the first in the world.

While Wave deals in software, Tokyu Hands, in Tokyo's Shibuya district is the model for the *hardware* store of the 1980s. Dubbed a "creative life store," it is a modern version of the American general store, a 23-level emporium which showcases literally thousands of examples of the best and most innovative of consumer goods.

One small shop in Akihabara sells nothing but transformers of every imaginable type and size.

What's inside? What isn't?

A complete electrical and electronics department/computer store; a hobby shop and toy store with an emphasis on technical items; a fabric division which sells everything from traditional Japanese indigo cloth to industrial materials; advanced bicycle and automotive departments; art and stationery supplies. Customers in Tokyu Hands know that they are seeing the most functional and best-designed merchandise in the nation. The designation "creative life" says it all. Tokyu Hands is about technology's direct stimulation of the human imagination.

The effect of technology on the consumer marketplace is more than putting new items on store shelves, too. The Walkman is responsible for one unusual new application of radio. A chain of department stores called 0101 now features miniature FM radio stations that entertain and offer new product information to shoppers in the stores. Various departments have their own stations, which, instead of call letters, are identified by vegetable names: Potato for information about technical goods,

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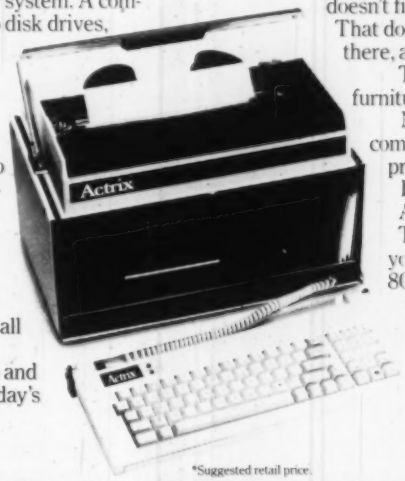

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Design, in Japan, is equally important in marketing consumer technology. Industrial designers seem to have been heavily influenced by the Italians, but a "Tokyo Style" is also becoming evident. Contemporary styling, especially in consumer electronics, is still primarily functional, and miniaturization continues as a trend. But there has been a burst of color, best typified by the simple and playful designs of so many radios, televisions, Walkman-type players, and even computers. It is not uncommon to fall in love with one of the new TV sets from Sony, Matsushita, or Hitachi which are housed in elegant metal cabinets in primary colors, red, blue, or yellow. Even NEC's 8201 notebook computer is available in a fire-engine red model, as are many home computers.

Furthermore, the use of very nontraditional colors such as pale pinks and greens as settings for consumer technology is on display in the mammoth Sony showroom in the Ginza district. This may be a youthful fad, but the staid greys, beiges, silvers, and blacks generally associated with these items may well spread across the Pacific.

Shapes, as well as colors, are changing. Sony's Flamingo record turntable is the best example. It is a white 10" tower which plays records vertically with a linear-tracking tone arm. And while miniaturization continues, there seems to be a new approach, a kind of down-sizing that recognizes the dimensions of the human hand. Many new designs in consumer audio gear fit into the new "midi," not mini or micro category.

Functional Miniaturization

Westerners should remember, however, that the Japanese began making things smaller for a reason. Space is very, very precious in this crowded nation. One way to conserve it is to combine the functions of several instruments, and some new consumer products are integrating monitors and computers, and television sets with video recorders. Most notably, home videocassette recorders have been built into small televisions by National and Toshiba, turning the end result into a practical new information appliance. (Video recorders have long lost their luxury status in Japan, and it is not unreasonable to assume, when meeting any young Japanese, that he has one at home.)

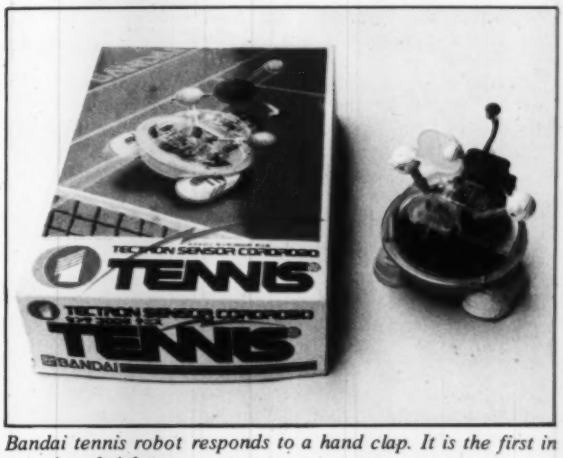
Likewise, the Paxon PCT-50 is a combination home computer, RGB video monitor, and television set. Its separate keyboard connects, via cable, to the front of the set, which also has a ROM cartridge slot. The machine is stunning, especially in red metal. More importantly, it is part of the growing number of computers using the MSX standard operating system and Basic.

Pioneer's recently introduced PX-7 computer (another MSX machine) is matched to the company's newest video Laser Disc player. It not only manipulates the player functions under program control, but can overlay computer-generated text and graphics, in color, onto full video from the videodisc. Digital information—programs and data—can also be dumped from the audio tracks of the videodisc into the computer RAM memory. The PX-7, which sells for about $400 in Japan, makes interactive video programs, visual databases, and laser arcade games practical for the home market. It is one of, if not the most significant consumer electronics product of the year.

Westerners should remember that the Japanese began making things smaller for a reason.

Growing Interest in Microcomputers

The microcomputer, or "micom" as it has come to be known in Japan, is only beginning to capture the public interest. Advertisements for office automation systems (widely abbreviated as OA) are common in subway and train stations, with well-known public figures, movie stars, and even champion sumo wrestlers endorsing various brands. Their growing popularity was reflected when the first of Tokyo's many *kissaten* (coffee shops), Cafe Zero, installed micoms for its customers. During the day, women reportedly use the machines to learn about "wordpro" (word processing) in hope of making extra money from in-home



Bandai tennis robot responds to a hand clap. It is the first in a series of eight.

Pioneer PX-7 MSX computer has the ability to mix computer and videodisc signals interactively.

work. On weekends, men take to the machines to figure their sports betting odds.

Five or six years ago, when American microcomputers were imported into Japan for the first time, only English characters could be displayed on the screen. Today, Japanese computers for the home market also use *katakana*, a limited character set used primarily in business applications. But written Japanese—and many, if not most, communications are still handwritten—uses *kanji*, or pictographs. Since there are thousands of these, it is doubtful there will ever be a keyboard to accommodate the well-written Japanese word.

Advertisements for office automation show public figures, movie stars, and even champion sumo wrestlers endorsing various brands.

Basic, in the U.S. is touted as English-like, which presents another barrier to the use of computers in Japan. While English is taught in Japanese schools, and writing is emphasized over speaking, the similarity between English and Basic is really only a vaguely associative one. And, the standard QWERTY keyboard, with which Westerners have some familiarity through the use of typewriters, is a completely foreign object to many Japanese people.

Despite these obstacles, there is an enthusiasm over micoms. The national Japan Microcomputer Club has nearly 10,000 members, a computing center in Tokyo's Ginza district, and 28 branches throughout the country. Extremely well organized, it holds classes in programming and applications, organizes summer camps for children and parents, publishes the *Micom Circular* newsletter (and an English language supplement), and sponsors national competitions among its members.

According to the group's survey, personal computers are owned mainly by engineers, students, and researchers (45.1%) between 20 and 34 years old (57%) who use them for academic study and in associated electronic applications (52.5%). As in the United States, users seem to be searching for serious professional uses to justify their ownership. While many contend they are already using them in their work (26.1%), fully one-third of the club's members say they use their machines for games and hobbies. The organization does, however, require a statement of a "life work target" on its applications for membership.

Innovation and dedication to learning about microcomputers is reflected in the prizewinning projects entered into annual competitions. Among these: A color and sound sensing robot, designed by Naotaka Yokoyama, which "walks and talks with synthetic voices." The robot responds to the presence of people and can differentiate red, green, and blue traffic signals. A robot arm, the Mitsubishi Move Master was programmed by Tadashi Hino to catch wooden blocks, recognize their shapes, and put them into their respective holes in a board.

Akihiro Yamashita won a prize for designing a flight simulator which puts users in the cockpit of an American F-15 fighter. He wrote the program on a 6809-based computer of his own design.

Among the other activities of the club are international tours (a group usually visits the annual West Coast Computer Faire in San Francisco) and shows held all across Japan. Besides their annual convention, the group recently sponsored a fair spotlighting what are termed "cute computers" like the NEC 8201 and other portables and hand-helds.

Communications for the Future

Computers figure heavily in communications plans for the future, as well. Although Japan readily admits that much of the technology for which it is now highly regarded, including microelectronics, was imported from other nations, and acknowledges the lead of others (particularly the U.S.) in these fields, it claims fiber optic technology as its own. Fiber optics, with their ability to carry extremely large volumes of information at high speeds, are central to the nation's plan to turn communities into Teletopias. These will be "cities for the future, linked with advanced communications networks."

Fujitsu "MY OASYS" is unusual for a Japanese word processor as it uses a QWERTY keyboard.

Fiber optics are central to the nation's plan to turn communities into Teletopias.

The Teletopia plan calls for communications satellites and optical fibers to link homes, community facilities, offices, and information repositories. Two different networks, CAPTAIN (Character and Pattern Telephone Access Information Network) and VAN (Value-Added Network) will feed the system from large cities. Each of ten model cities will also establish its own local INS (Information Network System) to aid local industries, farming, forestry, and fishing, and to enhance education, public information, and medicine. Residents will take advantage of the network to shop and bank at home, and to extend schooling to in-home tutoring. Businesses will use the systems for transmitting data and graphics (including electronic facsimile, which is far more widely used in Japan than in the U.S.), and for videoconferencing.

While there is no single element of the Teletopia plan that hasn't been talked about or already introduced in the United States, it is significant that the Japanese are taking their unified, standardized approach to building such a system. This is being done under the direction of the government Ministry of Posts and Telecommunications, and with the cooperation of NTT, Nippon Telegraph and Telephone.

Silicon Valley—Japanese Style

No doubt these advanced communications techniques fit nicely into the national Technopolis plan, as well. In 1980, the Ministry of International Trade and Industry (MITI) announced a scheme to create two or three areas that would serve high technology industry

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and research. Instantly, all but a few of the nation's 47 prefectures (regional divisions) applied to be included in the program. MITI rethought and asked 20 prefectures to develop master plans to integrate factories and business facilities with university and other public research institutions and housing developments. Each was required to be constructed near a "mother city" of at least 200,000 people and near air or rail stations so that "technopolitans" can go back and forth between the main cities of Tokyo, Osaka, and Nagoya within a single day. Of the 20 sites now targeted as Technopolises, six are on the southernmost island of Japan, Kyushu, nicknamed "Silicon Island" because of the concentration of microelectronic businesses.

Beginning March 15, 1985, the nation's enthusiasm over the wonders of science and industry will swell. Tsukuba Expo is likely to be the biggest technology party ever thrown.

(Train travel via Japan's famous *Shinkansen* bullet train already makes intercity travel possible. In the near future, the HSST—a magnetically-levitated high-speed surface transport—will further shorten travel times between cities.)

Some have criticized the Technopolis Construction Act, passed by the Japanese Diet, as faddish and trendy, and the word itself, has become something of a buzzword. The two-fold goal of the plan, though, is nothing short of lofty and inspiring. The first part involves "upgrading the nation's industrial structure that it will boast the creative and sophisticated advanced technologies welcomed by other countries." The second involves a kind of reunification of the nation and its families. By encouraging industry to be built outside of the major population centers, Technopolises will hasten the return of people who once migrated to big cities to find work, and help the smaller cities retain recent school graduates who would otherwise leave their provinces in search of jobs. In the future, these new towns will also help distribute the population and alleviate the burden of the intensely crowded cities.

In addition to the building of Technopolises, a major center for academic and private research and development has already been established approximately 50 kilometers north of Tokyo. Tsukuba Science City encompasses four towns and two villages. Although many of its research facilities were newly created, others have been relocated from Tokyo and other cities to benefit from the synergism it is hoped will result from the grouping.

Tsukuba is also the site for Japan's first real international celebration of science and technology, Expo '85. Beginning March 15, 1985, the nation's enthusiasm over the wonders of science and industry will swell. Tsukuba Expo is likely to be the biggest technology party ever thrown. The planners of this world's fair expect it to attract four times the number of visitors who travel to Japan's biggest attraction, Tokyo Disneyland. (The numbers are amazing. Of the thirty million people who live within 90 minutes travel time of Tokyo Disneyland, more than ten million visited it in its first year. Twenty million are expected to come to Tsukuba during the six-month fair season.)

High Tech Future

The theme of Expo '85 is "Dwelling and Surroundings—Science and Technology for Man at Home." An important sub-theme is the heavy emphasis on the role of children as the citizens of the future. To this end, much of the Expo will be a technological wonderland of impressive high tech audio-visual presentations, applications of communications technology, and fantastic architecture. Cosmo Hoshimaru, the fair's cartoon character mascot, was, himself, created by a Japanese school child.

Naturally, there is much corporate involvement in the fair. The steel and auto industries will have pavilions, as will every major company dealing in technology. In addition to the rosy portraits of the future proffered by companies like Toshiba (electronics) and NEC (computers and communications), there will be exhibits keyed to the natural sciences, health and biotechnology. Kodansha will sponsor a show entitled "The Brain: What a Fantastic World of Imagination!" The diversified Mitsui Group is behind "The Wonder of Man's Mind and Body." Matsushita will remind visitors of "The Roots of the Japanese and Their Culture," and Mitsubishi promises a pavilion about environmental concerns.

Not surprisingly, some of the corporate presentations will be produced by Americans. In Hitachi's "Interface—Free Conversation with Technology," the centerpiece will be stereoscopic images produced by filmmaker Murray Lerner (director of Epcot Center's 3-D movie at Walt Disney World) and computer graphics pioneer John Whitney Jr. Toshiba's pavilion will hub around a film by director and effects specialist Douglas Trumbull. It will use Trumbull's Showscan process, which takes and projects motion picture film at 60 frames per second for extreme visual impact.

For most people, the Expo will provide the first look at new hardware, such as the HSST Mag-Lev train. But for those who cannot make it to Tsukuba, high-definition (1125 scan lines) video will bring the fair to remote "satellite station" viewing centers in Tokyo and elsewhere.

The goal of Tsukuba Expo is both to encourage the nation's love of technology as well as to bring the world to Japan to experience it firsthand. It will be the first time that many Americans will have the opportunity to begin to understand the nation, its people, and this extraordinary rush to the future.

Japan does not present a clear image in the mind of the average citizen of the United States. It is often perceived as a threat to American jobs and leadership. Ironically, we are also the largest and most eager market for so many of its manufactured goods. It is our nature to look skeptically on the cultural uniformity of the Japanese society, yet we admire its style and envy its productivity. So many of our impressions come from decades-old information, while the face of Japan has changed dramatically in just the last ten years.

It is only natural to fear that Japan has the sole franchise on the future, but nothing could be further from the truth. We must, however, decide what the common goals of our two nations and the industrialized free world are, and as friends, cooperate to achieve them. We have so much to learn from each other.

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The Rising Sun Approaches High Noon: Outlook for the Information Industries

情報産業の展望

William H. Davidson

Japan continues its fast and furious progress in information technology markets. Japanese firms have staked out market leadership positions in semiconductor and bubble memories, facsimile equipment, large digital switching systems, microwave communications equipment, and dot matrix printers. They hold strong or leading technology positions in areas such as gallium arsenide and super-lattice semiconductors, vertical and optical data storage systems, flat displays, robotics, and supercomputers.

William H. Davidson is an associate professor of business policy at The Colgate Darden Graduate School of Business Administration, University of Virginia. He has written many articles and books about international business and technology including, most recently, *Global Strategic Management* and *The Amazing Race: Winning the Technorivalry with Japan.*

Growth rates among Japanese vendors in many cases exceed the highest hopes and fears of observers on both sides of the Pacific. Japanese exports of computers, peripherals, and components to the United States alone topped $1.5 billion in 1983. That figure represents a growth rate of 250% over the prior year.

Areas of particular strength include disk drives, printers, and components. Japanese producers of floppy disk drives shipped 2.6 million units in 1983—fully ten times the 1981 level. Printer shipments, dominated by dot matrix products, reached 1.9 million units in 1983.

Shipments of RAM memory chips to the U.S. doubled in 1983 to approximately $350 million worth. About ten percent of that total consists of new 256K RAM chips, the cutting edge of semiconductor memory technology. Areas of even greater growth include communications components (400%) and microprocessors (300%).

These successes represent the vanguard of a massive effort to achieve market leadership across the entire range of information technology. Significant investments are being made to strengthen existing footholds and open new ones. Over the past five years, more than half of the research and capital budgets of the six major Japanese suppliers (Fujitsu, Hitachi, Mitsubishi, NEC, Oki, and Toshiba) have been dedicated to semiconductor activities. In the future, additional areas of activity will assume increased emphasis. Some of the major future thrusts are already emerging.

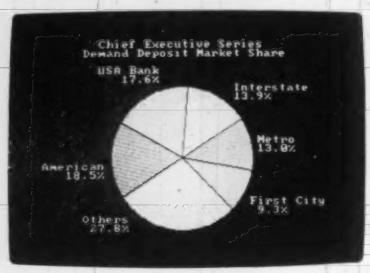
Opto-Electronics

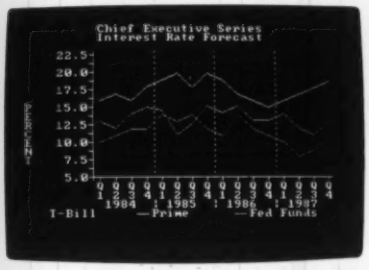
A $110 million joint research project co-sponsored by MITI operates out of Fujitsu's Kawasaki research center. The five companies participating in the project are actively developing fiber optic technology and related optoelectronic devices.

Japan's most ambitious plan involves development of a nationwide Information Network System.

PIPS

Japanese firms operate at a tremendous disadvantage in one area of information processing. Their language consists of thousands of unique symbols that cannot be readily reduced to digital code. The Pattern Information Processing System processes images as opposed to digital input. Originally intended to permit processing of kanji input, this technology can be applied to character recognition, data input, and word processing applications. A major joint





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project is developing applications for this technology.

INS

Japan's most ambitious plan involves development of a nationwide Information Network System. This program, managed by Nippon Telephone and Telegraph, calls for investments of more than $120 billion over the next 15 years. Key features of the system include a fiber optic cable network, voice recognition and voice synthesis capability, video displays, and facsimile technology capable of responding to inquiries by voice. A model INS system will be completed in the fall of 1984 in the Tokyo suburb of Mitaka.

The Fifth Generation Project

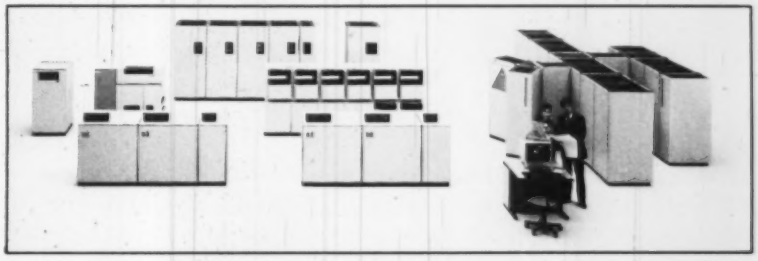
The widely publicized Fifth Generation Project marks a major initiative in computer research. The project includes a significant effort in software development, notably in artificial intelligence and expert systems, but the primary thrust lies in developing new computer logic and processing structures. Co-processing development, or the integrated use of multiple processing units, represents the key target in this effort.

The first output from this effort should occur in early 1985 with the introduction of SIM, the sequential inference machine. SIM will fit on an average desk, but pack processing power of 2 MIPS and 20Mb of main memory. It will be the workhorse for development of the new software and co-processing technologies the Japanese believe will take them to a leadership position in the mainstream of information processing.

Supercomputers

Closely related to the Fifth Generation Project is yet another national program to develop a new generation of supercomputers. Funding for this project totals about $300 million, compared to $450 million for the Fifth Generation effort. The initial and perhaps primary focus of this project involves the development of next generation electronic devices. Key areas of research include High Electron Mobility Transistors (HEMT), including gallium arsenide, Josephson junction, and super-lattice semiconductors. These devices are to be used in supercomputers based on conventional processing structures, but because these semiconductor technologies are six or more times faster than existing technologies, dramatic increase in speed and power can be achieved.

Japanese vendors are already extremely active in the supercomputer market. Fujitsu's VP-200 operates at 500 mega FLOPS (floating operations per second). Hatachi's S-810 boasts a 630 MFLOPS speed, and NEC has announced its SX-2 for delivery in late 1984 with an advertised processing speed of 1300 MFLOPS.



Hitachi S-810 Array Processor supercomputer has a processing speed of 630 floating point operations per second.

The NEC SX-2 supercomputer was the first to break the gigaflops barrier (one billion floating point operations per second).

Software

Japanese software skills and development efforts are frequently underrated. Massive efforts exist to improve their standing in this area. Government efforts are widespread, including very favorable tax treatment of software revenues (75% tax exempt) and several publicly funded development efforts. The Joint Systems Development Corporation, backed by government funding, employs 16,500 software programmers. The new Software Development Agency was formed by MITI in 1982 to further support efforts in this area.

Individual companies are also taking significant steps in this area. Fujitsu devoted half of its 1983 research budget to software development and opened a software development factory employing 1300 programmers next to its Numazu mainframe assembly plant. The primary focus of much of these efforts is on improving and automating the software development function. The focus here is on process technology rather than on new software products. Even in soft-

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I

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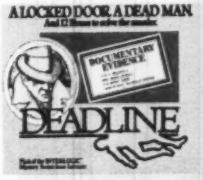
III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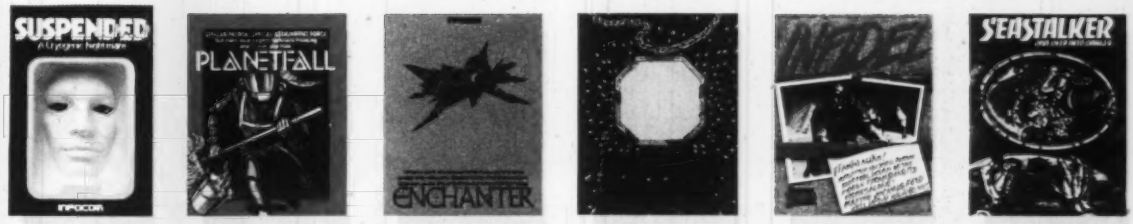

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CIRCLE 130 ON READER SERVICE CARD

ware, Japanese firms are rapidly closing the gap with the rest of the industry.

This growing tide of technologies carries the future hopes of the Japanese information processing industry. With these new technologies, plus the continued embodiment of their traditional strengths in low cost and high quality products, Japanese firms will seek an expanding, dominant presence in world markets. Given their impressive progress to date, it is not difficult to envision such an outcome. Yet, Japan's strategy in this industry must be executed in a highly competitive environment.

The U.S. Industry

The American information processing industry is far more aware of the Japanese threat and far less arrogant about its potential impact than other industries have been. American firms are acting aggressively to counter Japan's strategies in this arena. More important, perhaps, the emerging role of the U.S. government in this industry indicates a powerful national commitment to retaining leadership in this critical industry.

The competitive response of U.S. industry includes efforts to adopt some of the techniques that have made Japanese firms successful. Efforts to reduce inventory, improve quality, and lower costs are widespread. Results are already apparent. A major producer of peripherals reports that in 1983 they increased output by 30%, cut inventory by 35%, and reduced manpower by 25% while increasing quality. These benefits were achieved through adoption of techniques that require minimal capital investment.

Investment is occurring in manufacturing, however. Factory automation programs are widespread. IBM Corporation invested more than $11 billion in plant and equipment between 1979 and 1984. Digital Equipment Corporation invested more than $3 billion. Unprecedented amounts are being invested throughout the industry. These efforts attempt to achieve cost reduction benefits that will make U.S. products competitive with Japanese offerings.

While attempting to neutralize Japanese advantages in cost and quality, U.S. firms are pressing their advantage in the area of technological leadership.

While attempting to neutralize Japanese advantages in cost and quality, U.S. firms are pressing their advantage in the area of technological leadership. Massive efforts are under way to generate new technologies. IBM invested more than $13 billion in research and development between 1979 and 1984. Other major suppliers exhibit a similar heightened emphasis on R and D.

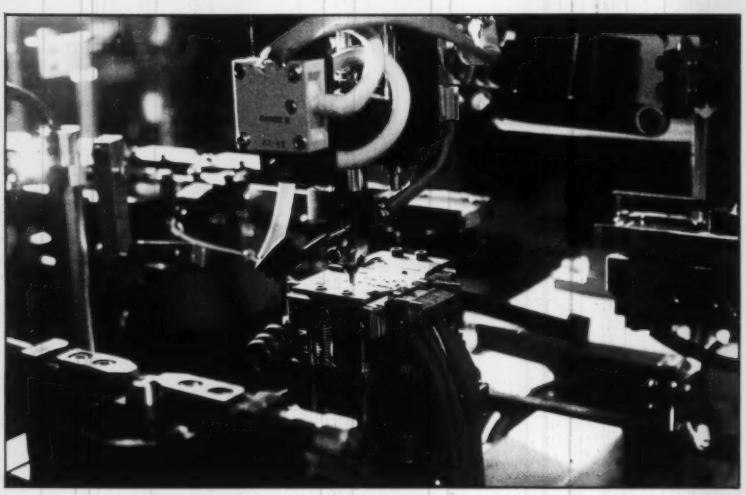
In addition to traditional corporate research efforts, several other sources of technology are receiving increased emphasis. Between 1975 and 1979, approximately $2 billion was invested in venture capital activities in the United States. Between 1979 and 1984, more than $10 billion flowed into new ventures.

The information processing industry received the largest share of these funds. The returns from these investments can already be seen in firms such as Apple, Convergent Technologies, Daisy Systems, Sun Systems, VLSI Technologies, and many others. These firms represent only the advance guard of an emerging army of aggressive contenders. Little-known and unpublicized ventures are today developing radical technologies and products that will revolutionize segments of the information processing industry.

Defense Department support also represents an area of increased activity. DOD funds finance the $450 million Very High Speed Integrated Circuit (VHSIC) Project, which is developing the next generation of semiconductor technology. The ICAM project, also funded by the DOD, is designed to develop new manufacturing technologies. DARPA, the DOD research arm, has budgeted $500 million over five years for supercomputer research. In February 1984, the DOD announced a $100 million Gallium Arsenide research and development project, citing dependency on Japanese suppliers. These and other efforts will greatly strengthen U.S. technology.

Perhaps even more important, the DOD budget calls for an increase in procurement of electronic components and systems from $4.8 billion in 1983 to $13.2 billion in 1987. Many leading American firms, such as Texas Instruments, already derive half or more of their revenues from federal purchases.

Joint research efforts also promise to be major contributors to American technological reservoirs. The Microelectronics and Computer Technologies Center in Austin plans to spend $50 to $100 million annually on research. The Semiconductor Industry Association research consortium has announced plans to invest more than $100 million in semiconductor research. Researchers at Los



Industrial robots in Oki Electric Honjo plant are used to produce components for various advanced communications systems.

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Alamos, Lawrence Livermore Laboratories, and Stanford Research Institute are cooperating in a supercomputer research effort. In addition to these formal projects, literally hundreds of informal cooperative efforts are under way throughout the industry.

The American industry is taking the steps necessary to compete with Japan in terms of cost, quality, and technology. While significant, these efforts in themselves cannot offset the Japanese industry's tremendous advantage of dedicated public support. The Japanese government promotes and protects its information processing industry with single-minded zeal.

All signs indicate an increasingly active, positive role by government agencies in support of the U.S. information processing industry.

Yet, recent actions by U.S. government agencies indicate that Japan's competitive edge in terms of public support may be shrinking. In the last several years, agencies of the U.S. government have helped achieve increased access to Japanese markets for U.S. suppliers. The Nippon Telephone procurement market, formerly reserved almost solely for the six major Japanese vendors, is now open to U.S. suppliers. Five American producers manufacture and sell semiconductors in Japan.

The U.S. Justice Department filed suit against Japan's six major firms in 1982, charging them with predatory pricing in the semiconductor memory market. The Commerce Department negotiated a voluntary import quota on Japanese semiconductors in 1982 and has actively pursued anti-dumping suits involving Japanese suppliers in the communications equipment market. The Federal Bureau of Investigation played an active role in investigating complaints of industrial espionage in the computer industry. All signs indicate an increasingly active, positive role by government agencies in support of the U.S. information processing industry.

Outlook

Japan's resolve and America's resources both will be tested in the on-going rivalry for leadership in information technology. For the first time, an American industry and government acting in a prepared and positive fashion will line up against the fine-tuned Japanese industrial machine. It promises to be a very interesting race. While the outcome is very much in doubt, several predictions can be made with virtual certainty.

In every industry the Japanese have entered, prices have declined, quality standards have improved, waste and inefficiency have been eliminated, and responsiveness to user needs has increased. The U.S. information processing industry exhibts a very positive track record in these areas already, but it will be no exception. The on-going, intensifying rivalry in this industry will generate a growing stream of better and cheaper technologies. Consumers will benefit, although technological and vendor risks will increase.

In every industry the Japanese have entered, existing firms have been acquired, refocused, or eliminated, and workers and managers have suffered under more demanding job conditions and unemployment. This industry will not be an exception. Pressure on industry participants is increasing dramatically. These pressures will be felt in the form of price, margin, and cash flow reductions, rising capital requirements for automation and research, and shortened product life cycles.

There will be casualties as the race for leadership in information technology unfolds. For the immediate U.S. and Japanese participants, it will be a demanding exercise. Grinding competition promises to be a pervasive feature of life in this industry for the foreseeable future.

The results of the competition hold important implications not just for the immediate participants and those close to the industry in other capacities. The information technology sector holds the key to world industrial and economic leadership. The outcome of this race will determine the balance of economic power for the foreseeable future. With stakes of this magnitude and determined competitors from both the U.S. and Japan, this unfolding drama promises to hold center stage in world affairs for many years to come. 完

Japan Wires Into Circuit-Making Machinery Market

As recently as 1979, most of the world's microcircuit-making machines, including plasma etchers, wire bonders, automated testers, wafer steppers, and aligners, were made by U.S. companies. The Japanese, however, have started to make inroads in this $5.6 billion market as they have in so many others.

The U.S. share of market dropped to 65% in 1983 from 79% in 1979. During the same period, the Japanese increased their share to 32% from 14%, and industry observers expect their share to increase significantly this year.

The Japanese, who manufacture about one-third of all integrated circuits worldwide, are now supplying about 80% of the circuit-making machinery for their home market. And they have recently increased exports to the U.S. For example, Nippon Kogaku, maker of Nikon optical equipment, expects to sell about 60 wafer steppers—complex camera systems costing $750,000 to $1 million—in the U.S. this year. Even Texas Instruments is testing new Nikon steppers along with some made by GCA Corp., the leading American maker.

In developing its circuit-making machinery, Nippon Kogaku is not just copying successful American designs. Indeed, it is now conducting research on an x-ray exposure system for production of very, very large scale integrated circuits (VVLSIs). The x-ray device is designed to draw a circuit line of 0.3 to 0.5 micron, the width needed in VVLSI chips.

U.S. companies still hold the lead in this market, however, and are doing their best to keep it. One way to do this is to spend more money on R&D. Among the companies that have done so is Kulike & Soffa Industries, a manufacturer of semiconductor assembly equipment that has held its own against Japanese competitors in part by trebling spending on R&D since 1979.

This pays off, and Japanese integrated circuit makers currently buy twice as much machinery from American suppliers as they do from their countrymen. Fujitsu, Mitsubishi, and Hitachi, for example, recently bought a total of 56 steppers from GCA. 完

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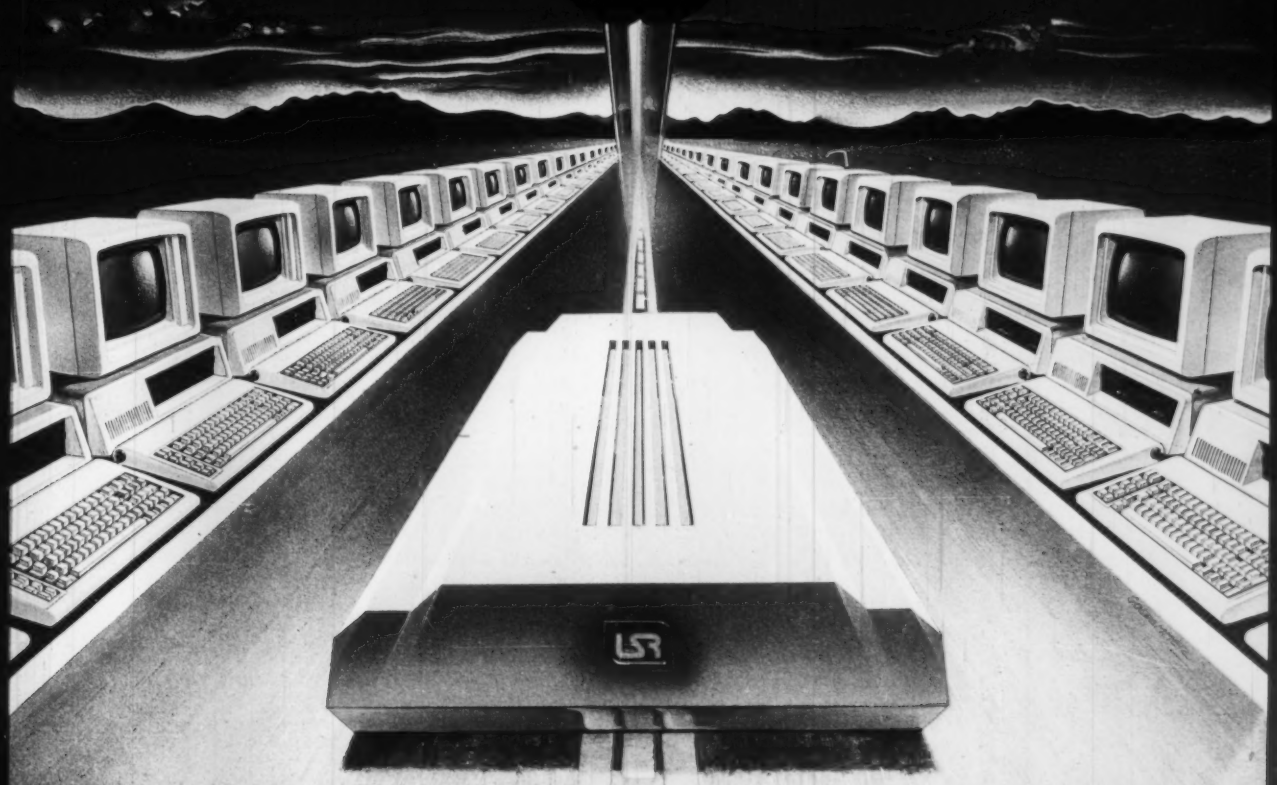

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The Fifth Generation: Japan's Computer Challenge to the World

第五世代・世界に対する日本のコンピュータチャレンジ

Edward Feigenbaum and Pamela McCorduck

Knowledge is Power

As early as the Chou dynasty, about the fourth century B.C., a certain Sun Tzu wrote a brief treatise called "The Art of War," which made much of knowledge for the successful conduct of war. Sun Tzu's wisdom would endure. Centuries later, his treatise was consulted by Chairman Mao and memorized in its entirety by officers of the Japanese Imperial Navy in World War II; a quote from it opens a U.S. Army field manual of the 1980s that marks the first significant change in army field tactics since the U.S. Civil War. Knowledge, says Sun Tzu, is power and permits the wise sovereign and the benevolent general to attack without risk, conquer without bloodshed, and accomplish deeds surpassing all others.

The New York Stock Exchange recently published its own treatise which says, less poetically, the same thing: increased productivity derives from more capital, from better capital, but most important of all, from "working smarter" with the capital at hand. American business leaders are as concerned with the art of war as Sun Tzu and his legion of international disciples have been, but in this century the battlefield has changed. Instead of the mountains and valleys of ancient China, the vital battlefield has become the international marketplace.

No nation understands all this better than the Japanese. And by the beginning of the next decade, the Japanese plan to be well on their way to utilizing the amassed knowledge of human civilization as their leverage to achieve a preeminent role in world trade. Other developed nations, in particular Great Britain and France, recognize the wisdom of the Japanese plan and are undertaking strategies of

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Edward A. Feigenbaum, Professor of Computer Science at Stanford University, is a pioneer in artificial intelligence and one of the originators of the concept of knowledge-based systems—computers that used stored knowledge to make decisions that would normally be made by human experts. These systems form the basis of the Japanese Fifth Generation of computers. Feigenbaum is the author of scores of scientific papers and has edited and co-authored several books, most recently *The Handbook of Artificial Intelligence* and *The Fifth Generation*, the book from which this article was excerpted.

Pamela McCorduck has written two novels and a history of artificial intelligence, *Machines Who Think*. She also writes articles on scientific topics for various magazines and teaches at Columbia University.

their own. Each such national program, including Japan's, revolves around the development of a new technology that embodies knowledge as its central feature—knowledge that will transform its holder's small advantage into a big, powerful, and eventually decisive advantage in any competition.

The United States, which pioneered the technology each of these national plans is based upon, and which has been preeminent in information technology for decades, has no such plan. A few industrialists and a handful of government officials are alert to these programs abroad and understand the consequences if the United States makes no rational plan of its own, but on the whole, Americans are remarkably indifferent to, even ignorant of, the challenges to our national predominance in everything from computing to finance, from industrial output to quality of life, that these other plans represent. We are, as usual, relying on matters to take care of themselves somehow or other. Because information technology moves so very much more quickly than other kinds of technology—halving in price and doubling in power every two years on the average—matters aren't likely just to take care of themselves in ways that Americans will be altogether happy with.

The Intelligent Machine as Automobile

To fashion machines that behave intelligently—that act in ways such that, were a human to act so, we would say, "Ah, that's intelligent behavior"—has been the explicit goal of a scientific field called artificial intelligence, which started more than twenty-five years ago with the introduction of the digital computer. Despite evergreen controversy and skepticism, the field has begun to create machines that, in some limited sense, reason. Often the reasoning power of these machines matches or exceeds the reasoning power of the humans who instructed them and, in some cases, the reasoning power of any human performing such tasks.

There's a fair parallel between intelligent machines and automobiles. In the world of artificial intelligence, it is, so to speak, 1890; the first automobiles have already appeared. They're hand-crafted horseless carriages, to be sure, but they're distinctly autos, different from wagons, carriages, and sleighs in good ways and bad.

The Japanese have studied this primitive horseless-carriage machine intelligence. They conclude that with certain major developments it can be a mass-market item. With the same kind of foresight Ransom Olds or Henry Ford once had as he examined the custom-built machines of Benz and Daimler, the Japanese have decided to improve upon greatly and mass-produce the intelligent machine. That means all the vigorous hand cranking, throttling, and wrenching a pioneer now accepts as the inevitable price of using the machine—the difficult programming languages, the struggles to make different programs compatible, the problems of putting human knowledge into machine form—are to disappear, eliminated in the new Japanese Fifth Generation of computers. This in itself would be remarkable enough, but the Japanese also intend to supply gas stations and roadways for the new machines, necessities for the users and sources of income for the supplier. Thus we recapitulate the story of personal transportation from the first hand-built Benz Patent Motor Wagon to the Honda Civic, for these new machines will also be "autos": self-propelled vehicles of the intellect.

Their goal is to develop intelligent computers that will be able to converse with humans in natural language.

The change from the speed of walking—about four miles an hour—to the speed of automobiles—about forty miles an hour—was an order-of-magnitude change that, while it didn't represent so very much in numbers, has transformed our lives utterly. (The next great order-of-magnitude change, from automobiles to jet planes that travel at 400 miles an hour, has made equivalent transformations in our lives.) This is central to what the Japanese plan for their new generation of computers: quantitative changes in computing speed, power, and reasoning that must make qualitative changes in our lives we can barely foresee. As for the computers that most of us are familiar with right now, they aren't horseless carriages. They're no more than bicycles.

What's the Big Idea?

The Japanese are planning the miracle product. It will come not from their mines, their wells, their fields, or even their seas. It comes instead from their brains. The miracle product is knowledge, and the Japanese are planning to package and sell it the way other nations package and sell energy, food, or manufactured goods. They're going to give the world the next generation—Fifth Generation—of computers, and those machines are going to be intelligent.

In October 1981, when Japan first let the world at large know about its plans for the Fifth Generation of computers, the Japanese government announced that over the next decade it planned to spend seed money of about $450 million (participating industries are expected to match, and perhaps double, that amount) and would eventually involve several hundred top scientists in this project. Their goal is to develop computers for the 1990s and beyond—*intelligent* computers that will be able to converse with humans in natural language and understand speech and pictures. These will be computers that can learn, associate, make inferences, make decisions, and otherwise behave in ways we have always considered the exclusive province of human reason.

Why have they chosen computing in particular? "Promoting a national project such as this in the computer industry, which has a strong effect on various leading technologies, will probably greatly influence the way in which research and development systems will be made in other industrial fields." Moreover, "our efforts will not only foster creative technology for our own computer industry, but will also provide our country with bargaining power. We also fulfill our duty as an economic power by investing in the development of such leading fields." In other words, the Japanese understand that if they succeed in this visionary computing project, they will acquire leverage over all kinds of industries, at home and abroad. The Fifth Generation is an exquisite piece of economic strategy.

About six months later, on April 14, 1982, an institute to guide the ten-year research and development program, called the Institute for New Generation Computer Technology (ICOT), was formally launched, its initial funding and new laboratories in Tokyo provided by the Japanese government. The first working papers to explore how such machines might be designed have been published, the first scientists to work fulltime on the project have been recruited. Elaborate plans have been drawn up which will allow the Japanese to move ahead step by step, evaluating their progress as they go, building on each success, and adjusting and revising for failure.

The Fifth Generation will be more than a technological breakthrough. The Japanese expect these machines to change their lives—and everyone else's. Intelligent machines are not only to make Japan's society a better, richer one by the 1990s, but they're explicitly planned to be influential in other areas, such as managing energy or helping deal with the problems of an aging society. Perhaps less grandiosely but equally important, the new machines will "serve as an active prime mover in all industrial fields by helping to increase the efficiency in those areas where increasing productivity has proven difficult," such as the primary industries (for example, agriculture and fishing) and the tertiary industries (for example, services, design, and general management).

But these are only the areas we can already see. There's a universe of possibilities essentially unknown to us that this research will open up.

"Development in unexplored fields can contribute actively to the progress of human society," the Japanese say. "By promoting the study of artifical intelligence and realizing intelligent robots, a better understanding of the mechanisms of life will become possible. The approaching realization of automatic interpretation and translation will serve to help people of different tongues understand each other, to reduce problems due to misunderstanding and ignorance, and to lead to further growth based on mutual understanding of cultures. With the construction of a knowledge base made possible, the knowledge which mankind has accumulated can be stored and effectively utilized, so that the development of culture as a whole can be rapidly promoted. Mankind will more easily be able to acquire insights and perceptions with the aid of computers."

The Japanese have been sending scientific emissaries to the West for years to study the pioneering artificial intelligence research in the United States, Great Britain, and Europe. The Japanese have grasped the great scientific themes that run through artificial intelligence, and they feel ready to gather up a loosely knit group of ad hoc projects and to consolidate and develop them into what can only be called a momentous national project. Its success—even partial—will vault them into a position of distant leadership in conducting the world's information business.

Their Fifth Generation plans say unequivocally that the Japanese are the first nation to act consciously upon the realization that the new wealth of nations can be viewed as something besides financial capital, secured from manufactured goods or land rental, as it was in Adam Smith's time. In this they have acted on a truth that has been emerging and reiterated for nearly two decades. The world is entering a new period. *The wealth of nations, which depended upon land, labor, and capital during its agricultural and industrial phases—depended upon natural resources, the accumulation of money, and even upon weaponry—will come in the future to depend upon information, knowledge, and intelligence.*

The primary resource of the postindustrial society is human capital.

This isn't to say that the traditional forms of wealth will be unimportant. Humans must eat, and they use up energy, and they like manufactured goods. But in the *control* of all these processes will reside a new form of power which will consist of facts, skills, codified experience, large amounts of easily obtained data, all accessible in fast, powerful ways to anybody who wants it—scholar, manager, policymaker, professional, or ordinary citizen. And it will be for sale.

Japan Decides to be the First Postindustrial Society

In a piece of social forecasting that looks more prescient all the time, Daniel Bell, a Harvard sociologist, presented the outlines of what he called the postindustrial society. The Japanese, whom he hardly mentions in his 1976 book, have obliged him by beginning to shape a society with just the features Bell discerned would characterize postindustrialism.

What Bell calls the "axial principle" of this postindustrial society is the centrality and codification of theoretical knowledge. Along that axis are a new intellectual technology, the spread of a knowledge class, the switch from goods to services, a change in the character of work, and so on. In the Japanese case, the new intellectual technology is artificial intelligence, in this instance, machines that amplify human thought. This technology will take its place beside writing, printing, mathematics, and other technologies that have changed the way we think.

Bell also predicts that the primary institutions of the postindustrial society will be the university, academic institutes, and research corporations. Indeed, the three sectors combining to bring about the Fifth Generation are Japanese universities, independent institutes, and the research laboratories of eight of its major firms.

The Wealth of Information

When Adam Smith published *The Wealth of Nations* in 1776, society was changing rapidly and England's economy was beginning to slip into a "post-agricultural" stage. Later, in the industrial economy of Queen Victoria's heyday, manufacture and trade accounted for most of the U.K.'s productive potential, as well as employing the bulk of the labor force. Political power had shifted from the landed aristocrat to the capitalist.

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In his new book, *The Wealth of Information*, Stonier argues that if we are to enjoy the fruits of the post-industrial economy, and not be its victims, governments must invest heavily in education, research, and the development of new sources of wealth.

The Wealth of Information is published in hardback and paper by Methuen London Ltd., 11 New Fetter Lane, London EC4P 4EE, England. Price of the 224-page paperback edition is £4.95.—*DHA*

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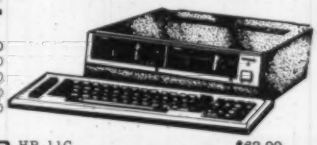

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CIRCLE 116 ON READER SERVICE CARD

The primary resource of the postindustrial society is human capital, says Bell. "Our one precious asset is our human resources," say the Japanese. The economic ground of the postindustrial society is science-based, says Bell. "The products of our country will be rendered unique and specialized in their respective fields due to their performance, design, and knowledge-intensive qualities," say the Japanese. "These achievements will further serve as a foundation for promoting the true knowledge intensiveness of our industries."

Of course, the postindustrial society has its problems: What should science and education policy be? How shall the public and private sectors be balanced? How shall society cope with bureaucracies and an adversary culture?

But these problems must seem an afternoon's work compared with the problems that have driven Japan to the Fifth Generation project. Japan is a nation of 110 million people (about half the population of the United States) who must live on an area just smaller than that of the state of Montana. It has no natural resources and very little arable land. For most nations, this would be the occasion to pound on the doors of the World Bank. In the past, it has driven Japan unsuccessfully to war. Now, however, faced with these perennial problems, Japan has seized the initiative and shrewdly reckoned that its new Fifth Generation of Knowledge Information Processing Systems (KIPS) could give Japan the lead in this race to become a postindustrial society.

The first and most obvious reason for this is the increase in productivity such machines will bring about. They are designed specifically to increase the productivity of knowledge workers—and here we mean professionals as surely as billing clerks—by orders of magnitude over what they can accomplish now. Knowledge workers, as we shall see, constitute the majority in the work force of developed nations, and their ranks will increase. Thus a significant improvement in their productivity will have profound economic effects.

The manufactured goods that Japan will sell will be so much better than the competition's, thanks to the degree of knowledge that will be brought to bear on their design and manufacture, that the Japanese expect to dominate markets in conventional products, too. But perhaps equally important to all the economic advantages the Fifth Generation promises is that intangible thing called quality of life. A society where knowledge is quickly and easily available to anybody who wants it will, we think, be an alluring place.

While many observers, especially Americans, have greeted the announcement of the Fifth Generation with some skepticism, the odds in this visionary national gamble are better than they might at first seem.

To begin with, the Japanese really do understand—and have formulated a national policy that anticipates—what the future will look like. In *Japan as Number One*, Ezra Vogel puts it bluntly: "If any single factor explains Japanese success, it is the group-directed quest for knowledge... When Daniel Bell, Peter Drucker, and others hailed the coming of the postindustrial society in which knowledge replaced capital as society's most important resource, this new conception became a great rage in Japan's leading circles. But these leading circles were merely articulating the latest formulation of what had already become conventional Japanese wisdom, the supreme importance of the pursuit of knowledge.

The Japanese really do understand what the future will look like.

A review of the shifts in the American labor force may illuminate this. As late as 1900, it took nearly 40 percent of the labor force to feed Americans. Now only 3 percent are needed. In less than fifty years, labor economists expect the same sort of shift to take place in manufacturing so that industrial operatives will constitute 4 to 5 percent of the work force too, down from the 25 percent they represent now. Nobody (save, perhaps, the French) expects the fantasy of the 1950s to take place: we will not move into a society where work is optional and the disposal of leisure time is our biggest headache. Instead, the rest of us will be service and information workers.

Knowledge is a Japanese passion. In the circulation figures of their newspapers (comparable to those of the United States, with a population half the size), in the scope of their educational TV programs, in the performance of their schoolchildren in subjects such as mathematics and natural science, in the numbers of Japanese who complete high school and postsecondary schools, in community groups that band together to study possible solutions to problems that confront them—in all these the Japanese reverence for information is obvious. The numbers in the Japanese labor force again tell the story: the Japanese are moving rapidly and eagerly into a well-educated, information-rich postindustrial society.

As for natural resources, those countries that depend on their resources alone have been dramatically disillusioned. In a phrase that can only evoke a sigh from oil-poor nations, oil wealth has been characterized as "a very mixed blessing" by none other than the former executive director of the International Monetary Fund. Yet he makes his point. The oil-exporting countries are extremely diverse, ranging from Algeria to Norway, from Kuwait to Mexico, but they have had surprisingly similar economic problems: the squandering of revenues, hyperinflation, stalled industrial development, an actual drop in agricultural production, and deeply painful social clashes among their various sectors—laborers, consumers, religious leaders who feel cheated, and government officials who feel accursed. Ali A. Attiga, an OPEC statesman, says that history may show that the oil-exporting countries "have gained the least, or lost the most, from the discovery and development of their resources." Although the oil-importing nations will probably not get out their handkerchiefs, a comparison between the standard of living in Japan and that of nearly any OPEC country says a great deal.

For the Japanese, without land or natural resources, do have the vital component of the new wealth of nations. They have that national passion for knowledge and the vision and will to parlay the passion into developing a technology that will reshape the world.

Having specified the number of disciplines, areas, and skills where the Fifth Generation will have a great impact, the Japanese announcement adds in strained syntax but justified optimism: "It is felt certain that Fifth Generation computers will trigger the realization of developments and phenomena heretofore undreamed of."

It all seems to smack of science fiction, but it is real and deeply important to the Japanese. In this article we shall argue that it is deeply important to all of us.

Simply put, Japan's survival as a nation is at stake. The Japanese are acutely aware that to remain competitive in world mar-

kets, they must increase productivity in those areas that so far have been neglected. The primary industries, such as fishing and agriculture, must become knowledge-intensive in order to become more productive. The tertiary industries, meaning services, management, and design, for example, must also become knowledge-intensive for the same purpose. As for secondary, or manufacturing, industries, their products will be superior because of their much higher quality, based on all the knowledge that will be poured into their design and manufacture.

The Japanese are a proud people, with a history of cultivated civilization stretching back before the unification of their nation under the Yamato court in the second century A.D. Thus, more important than it may at first seem, the Japanese intend to show by this project that they are capable of originality and not merely the copycat development of technologies originating elsewhere. Japan's national self-esteem is deeply bound up in the Fifth Generation project, and it is that pride that fires the national will to accomplish it.

Forty Samurai

It is early August 1982, a little more than ten months after the Fifth Generation conference. Feigenbaum and McCorduck are on the twenty-first floor of a modern but otherwise undistinguished high-rise in Tokyo, where, because of earthquakes, high-rises are unusual. On a door with a frosted glass window, typical of any insurance company or professional's office, is lettered in both English and Japanese, "Institute for New Generation Computer Technology" (ICOT). The office behind the frosted glass door has a splendid view of Tokyo, its bay, and even, in good weather, Mount Fuji.

Forty researchers sit in one big, sunny, pleasant room at long tables with fingertip-high partitions between those who sit face to face, but no partitions between those who sit side by side. Make no mistake, these are tables—not work stations, desks, terminal tables, or any such thing. Indeed, the only computers in evidence are over in one corner: a couple of Apple IIs, two or three minicomputers, and four terminals to a remote DEC-20 system. The researchers assure visitors that more new equipment will arrive in a month: another mini, another terminal to another DEC-20. Still, it doesn't look like a place propitious for revolution. In fact, most American computer science graduate students would turn up their noses at the austerity.

Nevertheless, revolution is the business of ICOT. It's revolution on two levels. The first is the obvious—the people at ICOT are going to bring about the Fifth Generation of computers, the second computer revolution. But very closely tied to that, perhaps a necessary precondition for it, is a social revolution, at least so far as the Japanese are concerned.

In the first place, except for ICOT's director, Kazuhiro Fuchi, everybody there—by Fuchi's demand—is under thirty-five, and in some cases well under that. Though Fuchi himself is in his mid-forties, he has long ago recognized that revolutions aren't made by the elderly, and he's insisted on this point. "Young," he says simply, "young and excellent."

Fuchi has long ago recognized that revolutions aren't made by the elderly.

The young and excellent have come from a variety of places, including the eight firms that make up the consortium backing ICOT—Fujitsu, Hitachi, Nippon Electric Corporation, Mitsubishi, Matsushita, Oki, Sharp, and Toshiba—and the two national laboratories that are also participating, the government-owned Nippon Telephone and Telegraph's Musashino Laboratories and MITI's own Electrotechnical Laboratory. The researchers have come to spend three years here for a variety of reasons. Most of them were hand-picked by Fuchi, young men who impressed him by their work on the numerous committees that deliberated before ICOT came into being; some are his former protégés. Most have come eagerly, hungry for the chance to work directly on projects of momentous significance and with responsibilities that wouldn't ordinarily be allowed them until they'd accumulated years of seniority at their various firms and laboratories.

However, a minority of researchers at ICOT hold other views. They come from firms that sent them grudgingly, firms that think the Fifth Generation project is going to be an international embarrassment for the Japanese, firms that contributed their workers only under duress from MITI. Such people are uncomfortable in the unstructured atmosphere of ICOT—who is to tell them what to do? They have adopted their firm's point of view—isn't this all much too ambitious? Do you see IBM embarked on anything so blue-sky? And worse, they find themselves doing what they consider dirty work, and so it is, the grubby business of designing and coding and trying and failing and experimenting and arguing that must inevitably take place at the start of a major project. There's been enough trouble from this minority in the first two months to provoke a delegation from the majority to entreat Fuchi to solve the problem. The dissension isn't good for morale, they warn; work may suffer. Fuchi reassures them. He hopes to convert the dissidents; he reverses the final decision to send them packing.

Even those who adore—the word is not too strong—their unusual director are often dismayed by him. A month after the center formally opened, the hardware committee met with Fuchi and showed him the fast-track two-year plan they'd devised for producing the prototype hardware scheduled for the first three-year phase. Instead of being pleased, Fuchi flew into a rage. That alone is unusual enough among Japanese managers, but what Fuchi wants is even more upsetting: cut that schedule down to a year and a half, he demands. The hardware committee is in shock. They already think themselves reckless in their two-year schedule. Fuchi will have none of it. "We *have* to manage to do this!" he says angrily. After a little while he calms down. "Go and think it over," he says more reasonably. "If you absolutely have to have two years, then you have to have them. But see if it can't be done in a year and a half. Loosen up on the quality assurance and give me a real machine in a year and a half."

Sitting with Feigenbaum across a conference table from Kazuhiro Fuchi one early August morning, McCorduck is fascinated by him and eventually reminded of Murasaki Shikibu's description of that eleventh-century hero, the shining Genji: "He brought pleasure to the eye and serenity to the heart, and made people wonder what bounty of grace might be his from former lives." Energy and intensity flow from Fuchi, touching everyone around him. He certainly doesn't talk very much, and he often leaves it to his supervisor of the international study department, a vivacious young woman, to translate what he has just said, although his English seems fluent enough when he wishes. He often speaks with his hands, eloquent gestures so that the foreign visitors

can almost guess what he's said before Ms. Yumiko Okada gets a chance to translate in her smartly colloquial English. He misses nothing, watching his young researchers make their presentations, assessing the reactions of the foreign visitors shrewdly. He sometimes looks as if he's enjoying a silent, private joke.

Fuchi strikes Feigenbaum as young in spirit, adventuresome, ready to take risks. Unlike the classical Japanese technological manager who, as he climbs up the ladder of authority, gradually loses touch with the technology he manages, Fuchi commands the admiration of his staff for his deep involvement in technical projects and his awesome knowledge.

In Feigenbaum's past conversations with him, Fuchi had seemed a man who despised the Japanese copycat stereotype, one that many Japanese themselves believe. On the contrary, Fuchi seems proud of native Japanese intelligence—almost arrogant about it, Feigenbaum senses. That might easily be overlooked as the cocoon of Japanese courtesy surrounds a visitor, but it's there, embodied in men like Fuchi who make it clear they believe it is no accident that Japan is on top, that no goal is too ambitious for such a gifted people. Fuchi almost seems to have taken on a personal campaign to wipe out once and for all the energetic but uncreative stereotype that shadows the Japanese.

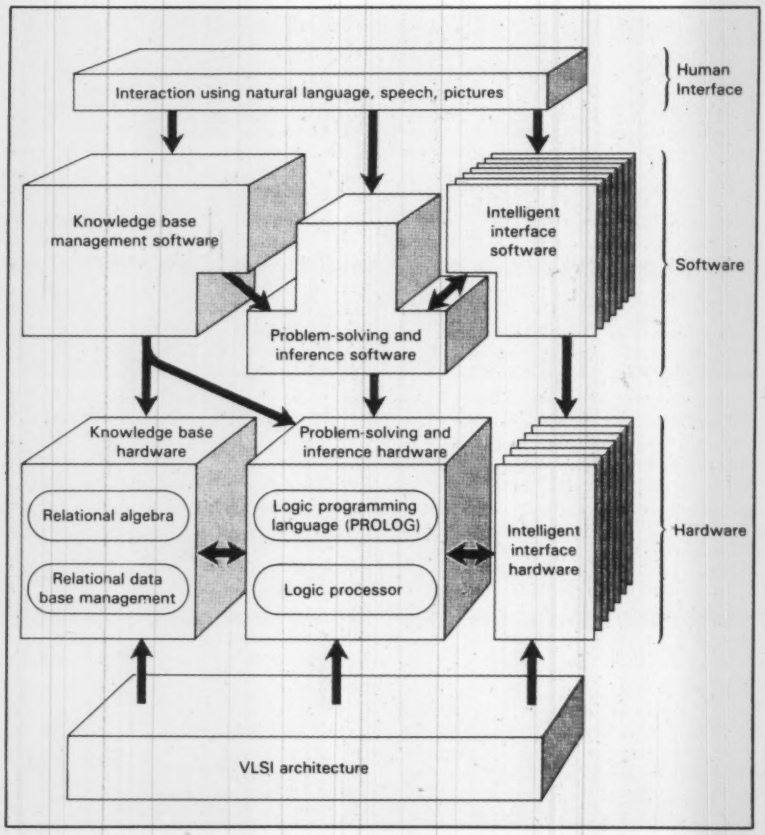
The director's office at ICOT is well furnished in the International style, with one glass wall overlooking Tokyo Bay. McCorduck thinks it ironic that the office of the man who will command a computer revolution looks down on the very spot where Commodore Perry and his notorious black boats once threatened to demolish Tokyo (then Edo) if America didn't get exactly what it wanted in the way of trade agreements with unwilling Japan. But if Fuchi ever dwells on that incident, it isn't because he's looking out his office window; in reality this office is a ceremonial place with pristine furniture and only a few books in the otherwise empty cases. Fuchi has installed himself instead in a low-partitioned section of the main floor, where he can oversee and be immediately accessible to his forty researchers.

In short, Fuchi is a type, rare enough in the West but almost unheard of in the East, one of those who, by sheer force of will, can make something out of nothing. He's the stuff of which legends are made.

And of course legends are already growing up around him. Late in the evening (not necessarily over the computer terminals) his researchers trade stories about him. In the nature of legends, no one is quite sure which parts are true and which aren't. The stories that get repeated most are those that Fuchi's own personality makes plausible. For example, they recount the tale—though no one can verify it—that as a young man their own age, Fuchi once got so perturbed with the way things were being run at the laboratory where he worked that in fury and desperation he stalked out and stayed away for a month, coming back only after his supervisor came to his house and pleaded with him to return.

Everybody knows that Fuchi has irrevocably resigned from his former post at the Electrotechnical Laboratory, a startling step for any Japanese employee, all the more one with such seniority. A high roller, he's placing all his bets on the Fifth Generation project. The legends add that Fuchi would have been eligible for a comfortable government pension if he'd only waited two or three months to resign his position at ETL, but he spurned anything so trivial as personal financial security to delay his project even by months. This is sensational to the young researchers who have grown up in the lifetime employment system of Japan. Here is a daring leader capable of the kind of innovative thinking the Fifth Generation demands. If it can be done, Fuchi will do it. Here is a leader who can take them where they want to go. He has smashed social stereotypes; he has tossed out social tradition. Why not scientific stereotypes and traditions, too?

Fifth-Generation Computer Systems



It is Hard to Predict, Especially the Future

The title above is taken from a wise aphorism attributed to the physicist Niels Bohr.

We stand today, before a singularity, an event so unprecedented that predictions

as we know them, and the singularity called reasoning machines will change things from how we know them in vastly unpredictable ways. "The appearance on earth of a nonhuman entity with intelligence approaching or exceeding mankind's would rank with the most significant events in human history," *Fortune* magazine declared in a recent series of articles on thinking machines. "While human beings can't possibly imagine the full consequences, the effects on technology, science, economics, warfare—indeed, on the whole intellectual and sociological development of mankind—would undoubtedly be momentous."

We are no different from our fellow human beings. We can't possibly imagine the full consequences of the widespread use of KIPS either. If hundreds of thousands learned to read so that Tom Paine's pamphlets might persuade them that they had justification for revolting against monarchies as a form of government, who can say how universal access to machine intelligence—faster, deeper, better than human intelligence—will change science, economics, and warfare, and the whole intellectual and sociological development of mankind?

Shadows and Light

In this article we have described a technology that promises to change our lives the way few have: reasoning machines are, as we have said, not just the second computer revolution, but the important one. If the details of the technology itself are complicated, the issues that surround it can be understood by nearly everyone. A superiority in knowledge technology provides whoever holds it with the power to resolve shades of gray into black and white—provides, in brief, an unequivocal advantage—whether we are speaking of personal power, national economics, or warfare.

The Japanese understand this perfectly. They have already begun to translate the understanding into the new technology that will give them unequivocal advantage over the rest of the world, perhaps by the middle of the next decade. Other nations recognize the soundness of the Japanese strategy—and, of course, its inevitability. In response to the farsighted Japanese, ambitious national plans are being drawn up in many places. But the United States, which ought to lead in such plans, trails along in disarrayed and diffuse indecision.

We have resisted calling this a crisis for the United States. We could pursue a dark thought, imagining artificial intelligence technology to slip away out of our control, which would ultimately have severe effects on our general industry, our standard of living, and our national defense.

We prefer instead to regard this Japanese challenge as an opportunity for the United States to revitalize itself, to join the Japanese and other nations in the world in the exhilarating adventure of moving the Empire of Reason, as historian Henry Steele Commager could once, with justification, call the United States, decisively into the Age of Reasoning Machines.

Fuchi is one of those who, by sheer force of will, can make something out of nothing.

In the end, we have no choice. We can decide *when* we shall participate, not *if*. The question of when begets how.

To the first question of when, we urge that it be at once. To the second question of how, we urge only that whatever plan is chosen, it embody what the American revolutionary generation possessed in abundance and ought to be ours once more: optimism, energy, authority, pragmatism, candor, audacity, and a taste for succeeding.

At the beginning of this article, we asserted that knowledge is power. We meant it not only in the vulgar sense, that one sleek, smart missile can clobber tons of dumb battleship, though that is demonstrably true; or even that a scientific instrument with built-in intelligence can outperform its dumb cousin that costs much more money, though that too is true. Most applications we've described, or we anticipate, have been material ones. For one thing, they're easiest to describe. For another, those are what Westerners are most comfortable with.

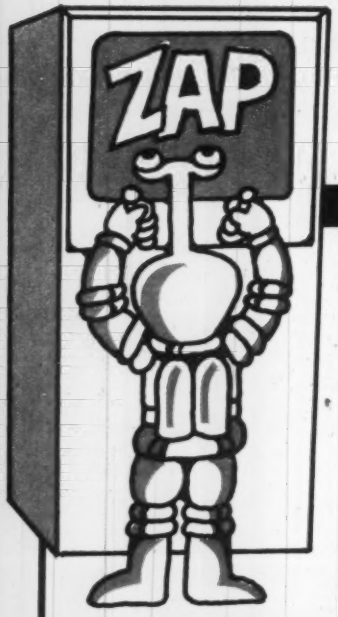
But there's a further dimension to a society dominated by knowledge that we should like to address, a nonmaterial dimension. The Japanese, having a very long history of putting material things in their place, which is an important place but clearly subordinate to and often in the service of nonmaterial concerns, are better at sensing the spiritual change the knowledge society might bring. A book by Yoneji Masuda, *The Information Society as Post-Industrial Society*, has some provocative things to say about the future.

Masuda makes a dense, detailed, and finally plausible case that our knowledge-rich future will coax us away from a preoccupation with material concerns and toward a preoccupation with the nonmaterial. He sees this taking the form of the freedom for each of us to set individual goals of self-realization and then perhaps a worldwide religious renaissance, characterized not by a belief in a supernatural god, but rather by awe and humility in the presence of the collective human spirit and its wisdom, humanity living in a symbiotic tranquillity with the planet we have found ourselves upon, regulated by a new set of global ethics.

It is decidedly *not* an otherworldly religious spirit, which makes it different from religious passions of the past. On the contrary, it is sharply focused on this world, with humans having a serious, direct, and continuous say in all matters that affect their lives. But those exercises will be characterized less by the "me first" attitude that has often prevailed in human affairs, and more by a spirit of mutual assistance toward shared goals.

It sounds utopian. And "utopian" often means hopelessly idealistic, beyond human reach. Surely, we can argue, Masuda's prophecies are unduly shaped by living as he does in a prosperous, homogeneous society where the seeds of such a way of life are already planted and sprouting. But "utopian" also means something we have said many times and in many ways that we deeply desire as a human good. Indeed, Masuda reminds us that all this corresponds to Adam Smith's vision in *The Wealth of Nations* of a universal opulent society, a condition of plenty that frees the people from dependence and subordination to exercise true independence of spirit in autonomous actions. What Masuda is saying is that soon the technology will be in place to permit such a society to exist all over the globe.

The reasoning animal has, perhaps inevitably, fashioned the reasoning machine. With all the risks apparent in such an audacious, some say reckless, embarkation onto sacred ground, we have gone ahead anyway, holding tenaciously to what the wise in every culture at every time have taught: the shadows, however dark and menacing, must not deter us from reaching the light. 完



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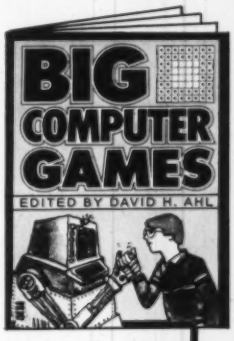

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Progress on the Project: An Interview With Dr. Kazuhiro Fuchi

プロジェクトの進歩・渕一博博士と語る

David H. Ahl

In sharp contrast to the ICOT research quarters described by Feigenbaum and McCorduck, 21 months later in April 1984 we found the same area overcrowded and a beehive of activity. The tables were piled high with books, notebooks, and papers. Computer terminals and Prolog workstations were sandwiched between the piles of books and papers. Most of the windows were shaded, probably because the glare interfered with the use of the CRT screens, although peering out at the bleak, gray weather was hardly inspirational. The DEC 20 was on its way out, soon to be replaced by a VAX system and more Prolog workstations.

Although many U.S. researchers in AI question the use of Prolog instead of Lisp, Fuchi is more and more convinced that Prolog was the right choice. He feels it is more suitable for producing the four basic software modules: problem solving and inference, knowledge base management, intelligent programming, and intelligent interface.

I asked how the software was coming along, particularly the modules to perform natural language processing. "So far," Fuchi said, "the focus is mainly on semantics although we are also working on translation between Japanese and English." Success in this area has proved quite elusive to many other researchers over the years. However, the Japanese are concerning themselves only with well-defined technical areas. Hence the size of the dictionary can be limited and there are few ambiguous word meanings.

Growth of the Project

By April 1984, the 40 researchers were now 42 in number; 3 from MITI, 4 from NTT (the national telephone company), and the remaining 35 from the 8 participating companies. Originally scheduled for three-year periods with the project, more than one-half of the researchers are now planning to stay for a longer period.

As the project nears the end of its third year, support from the government continues to increase. The first year (1982) allocation of ¥470 million ($2 million) was increased in 1983 to ¥2.7 billion, and in 1984 to ¥5.1 billion (over $22 million).

The project has yet to receive any financial support from the participating companies, although they are supporting it with the part-time services of about 100 people.

When the project was first conceived, it did not have the wholehearted support of many companies, even some of those who were furnishing researchers. Many saw it as too idealistic. But the past two years have seen a dramatic change in attitude, and today the project has captured the imagination of the computer industry and, indeed, the entire nation. There are still detractors, but that is probably to be expected with any innovative project with a commensurate high level of risk.

This year will see the completion of the initial stage of the project (see chart). Thus far, there have been no spinoff benefits but, said Fuchi, "we don't think of such things. If short-term benefits are what you seek, you don't need a national cooperative project. Individual companies can handle such things."

Impact on Personal Computers

Many journalists tend to mention the Fifth Generation Project and supercomputers in the same breath. Although the project utilizes some large computers for research, Fuchi feels "The real impact will be on the computers that are readily available to people—personal computers—rather than mainframes or supercomputers. The purpose of this project is to develop basic technology. Then, using this technology, you can make big computers and you can make small computers. But," continues Fuchi, "it is more important for the world to apply it to the personal type."

In his book about the project, Feigenbaum mentions several potential target applications for knowledge based expert systems such as improving the yield of

fishing fleets, improving the management of energy, and other similar things. Fuchi, on the other hand, feels that it would be unrealistic to expect such results from the initial ten-year project. He agrees that they expect to penetrate more and more fields, but it will take much longer than ten years.

Trends in Artificial Intelligence

Twenty-five years ago, the prevailing notion in the field of artificial intelligence was that with more computing speed and more memory, anything could be solved. As this approach appeared less and less promising, researchers started to concentrate more on understanding the nature of human thinking and problem-solving processes. Today, researchers have narrowed their goals even more and are focusing on more pragmatic facets of AI: teaching a computer to recognize objects, formulation of theorems in a specific area, and the construction of expert systems. I asked Fuchi about his position in the overall area of AI.

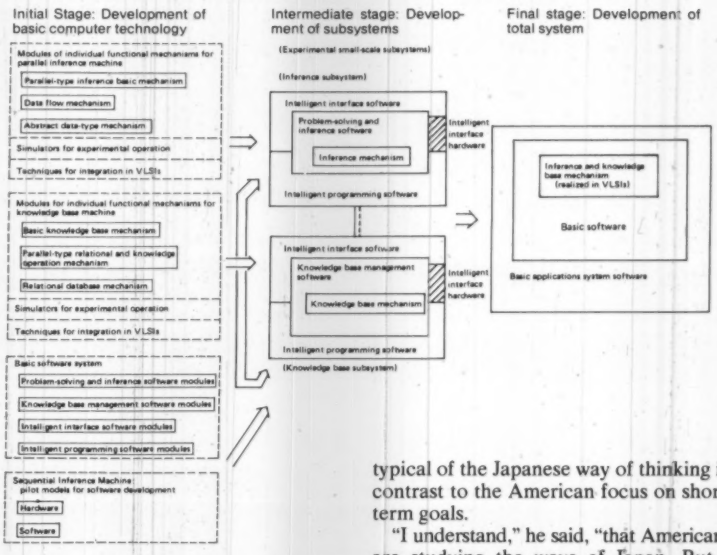
Fuchi confesses to having "a very skeptical opinion of AI for a long time. There were many optimistic people in the AI community. Against that, I was pessimistic and critical. However, I didn't think it was impossible." To realize meaningful goals, however, Fuchi feels it is necessary to utilize many different approaches and methods. For example, says Fuchi, "Is existing computer technology enough? I don't think it is. But by making a new computer can we solve the whole problem? No; it is not that simple." We must also study thought processes and many other things. "If you forget about hardware advancements, you cannot go further. However, to pick only one thing as the important thing is wrong," he says. "Many things are important."

Impact on Management

I found it interesting that Fuchi focused on personal computers rather than larger machines for the implementation of the fifth generation technology. In contrast to many other Japanese, Fuchi felt that large companies ought to be changing to more decentralized organizations. "However," he said, "in order to do so, help from many sources is needed." Beyond the desire of managers to decentralize, technology is also necessary. "Ultimately," he thinks, "this means that the personal computer must become more powerful and widespread."

Likewise, he feels that personal computers will provide increasing support for students at all levels of education. Like some visionary educators in the U.S., Fuchi does not see the benefit of using computers in education to teach students Basic or programming. Rather, he feels a natural language would permit the computer to be used as a far more powerful tool to explore other areas of knowledge.

Stages of Fifth Generation Computer research and development.


Initial Stage: Development of basic computer technology
Intermediate stage: Development of subsystems
Final stage: Development of total system
Modules of individual functional mechanisms for parallel inference machine
Parallel-type inference basic mechanism
Data flow mechanism
Abstract data-type mechanism
Simulators for experimental operation
Techniques for integration in VLSIs
Modules for individual functional mechanisms for knowledge base machine
Basic knowledge base mechanism
Parallel-type relational and knowledge operation mechanism
Relational database mechanism
Simulators for experimental operation
Techniques for integration in VLSIs
Basic software system
Problem-solving and inference software modules
Knowledge base management software modules
Intelligent interface software modules
Intelligent programming software modules
Sequential Inference Machine pilot models for software development
Hardware
Software
(Experimental small-scale subsystems)
(Inference subsystem)
Intelligent interface software
Problem-solving and inference software
Inference mechanism
Intelligent programming software
Intelligent interface hardware
Intelligent interface sofware
Knowledge base management software
Knowledge base mechanism
Intelligent programming software
(Knowledge base subsystem)
Inference and knowledge base mechanism (realized in VLSIs)
Basic software
Basic applications system software

Long Term, Not Short Term

Throughout our conversation, Fuchi tended to emphasize the long-term point of view in many ways. Indeed, this is typical of the Japanese way of thinking in contrast to the American focus on short-term goals.

"I understand," he said, "that Americans are studying the ways of Japan. But I think it is not good for them to copy literally." All is not perfect in Japan, he continued, "we have much criticism and problems in our ways."

On the other hand, he emphasized the importance of cooperation in creating the new generation of computers. "Not only Japan," he said, "but America and other countries as well, especially the younger generation, must cooperate in creating the new generation instead of competing for short-term gains." To make a beneficial impact on society and environment, "the entire world must help." 完

Fifth Generation Conference— Technical Reports also Available

As the Fifth Generation Project has progressed from a distant dream to the initial research stage, worldwide interest has been stimulated and discussion raised about international cooperation. Thus, the Institute for New Generation Computer Technology (ICOT) has announced an international conference on Fifth Generation Computer Systems (FGCS '84) to be held November 6-9, 1984 in Tokyo.

The first two days of the conference will be devoted mainly to invited lectures and reports on the current status and future plans of the project. The technical sessions on the last two days will include the presentation of invited and submitted papers and an active exchange of ideas and opinions.

Registration fee is $355. For more information, contact FGCS '84 Secretariat, ICOT, Mita Kokusai Bldg. 21F, 1-4-28 Mita, Minato-ku, Tokyo 108, Japan.

If you can't attend the conference, or if you would like some advance preparation, 37 technical reports and 31 technical memoranda are available from ICOT. Write the address above for a current list.

Dr. Kato and His Amazing Robot Friends

加藤教授と驚異のロボットフレンド

David H. Ahl

If the Long Island Expressway is the world's longest parking lot, the city of Tokyo may well be the biggest, especially at 5:00 p.m. Takayoshi Shiina, president of Sord, had kindly lent us his car and driver for our trip from downtown Tokyo to Waseda University, but we weren't making much progress. We called Dr. Kato from the phone in the car. "Which Dr. Kato?" the switchboard operator demanded. "Kato of robotics," we replied. We were connected immediately and the good professor said he would wait a few more minutes for us.

Six or eight people in New York, California, and Japan had told us about Dr. Kato, widely regarded as the father of robotics in Japan. But when we arrived at the dark, box-like, concrete buildings of Waseda University, we wondered if this dreary place could possibly be the home of the most sophisticated robots in the world.

After a few words of greeting, the energetic Professor Ichiro Kato soon set our doubts to rest. He showed us a videotape of the three latest projects at the university. Turning down the sound, he animatedly described (in Japanese) what was going on. Later, we saw one of the three robots "in the flesh," along with the start of another project.

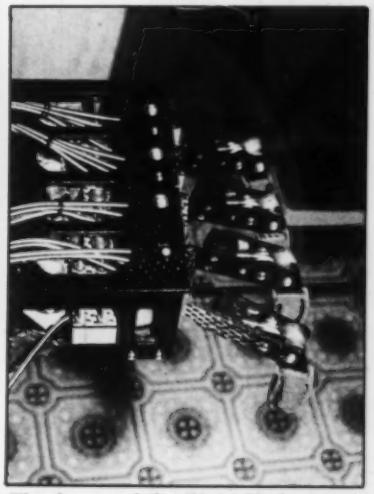
First of the three robots is a fingers and arm model that plays a piano or organ. According to Kato, "the purpose of building such a robot is to improve

Dr. Ichiro Kato of Waseda University has directed the creation of some of the most sophisticated robots in the world.

dexterity, speediness, and intelligence." He feels that in the future, robots will not only play an important part in secondary industry (assembly-line functions), but also in tertiary industry (service functions). The necessary functions for such robots, which must function in human-like surroundings, are dexterity, speed, flexible handling, and intelligence.

Thus it was felt that many of these functions could be studied by trying to build a robot that played a keyboard just like a human. Today the keyboard-playing WAM-7R robot has 14 degrees of freedom for the fingers and seven more for the arm.

The control system is hierarchical in nature with three levels; it is modeled on the human nervous/brain system. Finger and arm motions are produced by DC motors. As with a human, sensors provide positional feedback on some but not all of the joints.



The fingers of the WAM-7R keyboard-playing robot.

The robot can currently play a keyboard faster than any human. Hence, the researchers have moved on to the next stage which is to equip the robot with "eyes" so it can read sheet music and play automatically. A second hand and legs may also be added so it can play more complex pieces and use the pedals.

Perhaps someday, the WAM-7R will be combined with the legs of the WL-10R biped walking robot. This robot walks exactly like a human, bending its hip, knee, ankle, and foot joints appropriately. Moreover, it not only walks in a

straight line, but can turn around, walk sideways, and even walk as though on a narrow beam.

Currently, the walking period is somewhat slower than that of a human, a limitation of both the hydraulic mechanism and the computer control system. Dr. Kato told us he expects the walking period to be nearly as fast as a human (1.1 sec.) by the end of the year.

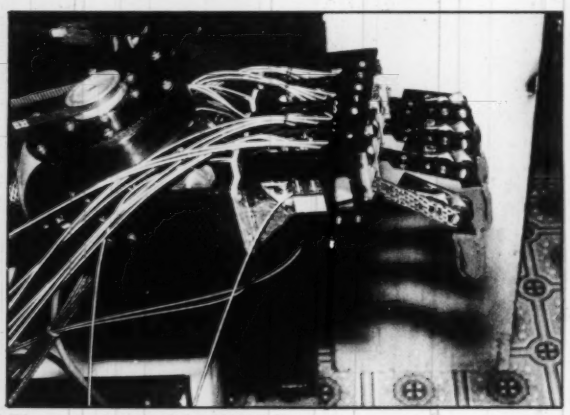
While the keyboard-playing hand and walking biped are primarily research studies, the third device promises to be of more immediate benefit. It is an above-knee prosthesis which is adaptable to a voluntary walking period with full knee, ankle, and foot motion.

The WLP-6 (Waseda Leg Prosthesis-6) is able to regulate its damping coefficient according to an amputee's voluntary walking period and can even generate a small driving force without any external power source.

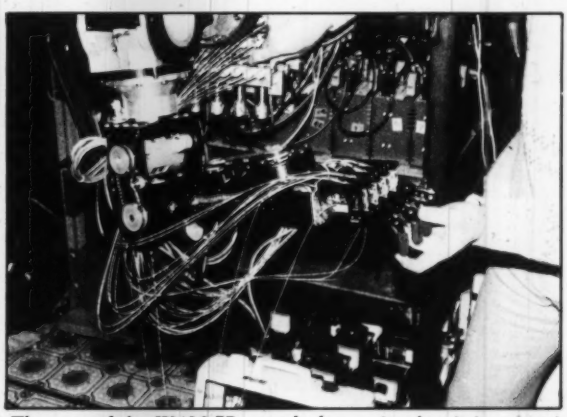
Of course, the amputee must carry around a small control box which includes a one-chip microcomputer. The main job of this computer is to pick up the amputee's intention to take a step. This is done by means of a surface electrode, one of the trickiest elements of the system, since EMG potential is affected by a person's fatigue and perspiration. Furthermore, it is a minute signal, easily contaminated by stray electromagnetic or current noise.

Nevertheless, the WLP-6 has been successfully used by two subjects, Mr. Harada, 20 years old, and Mr. Sagano, 57. When worn with trousers, it was quite impossible to tell that the device was in use. While the WLP-6 is probably many years away from being commercially marketed, it holds the promise of allowing amputees to take a giant step beyond the pegleg of old. 完

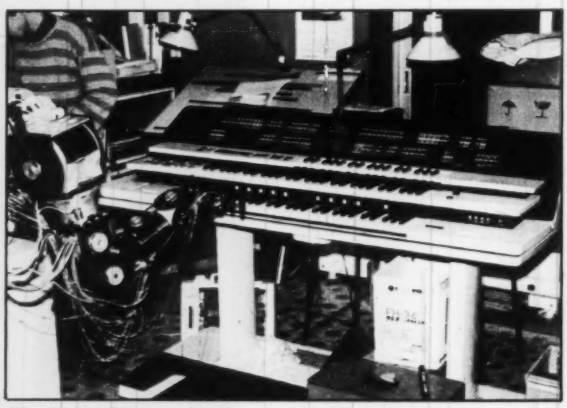
Yasuko Morihara, Dr. Ichiro Kato, and David Ahl in the Waseda University robotics laboratory.



The entire hand of the WAM-7R.



The arm of the WAM-7R may look massive, but it is approximately the same scale as a human arm and hand.



The WAM-7R can play the organ as fast as any human.

Dr. Kato looks fondly at his creation.

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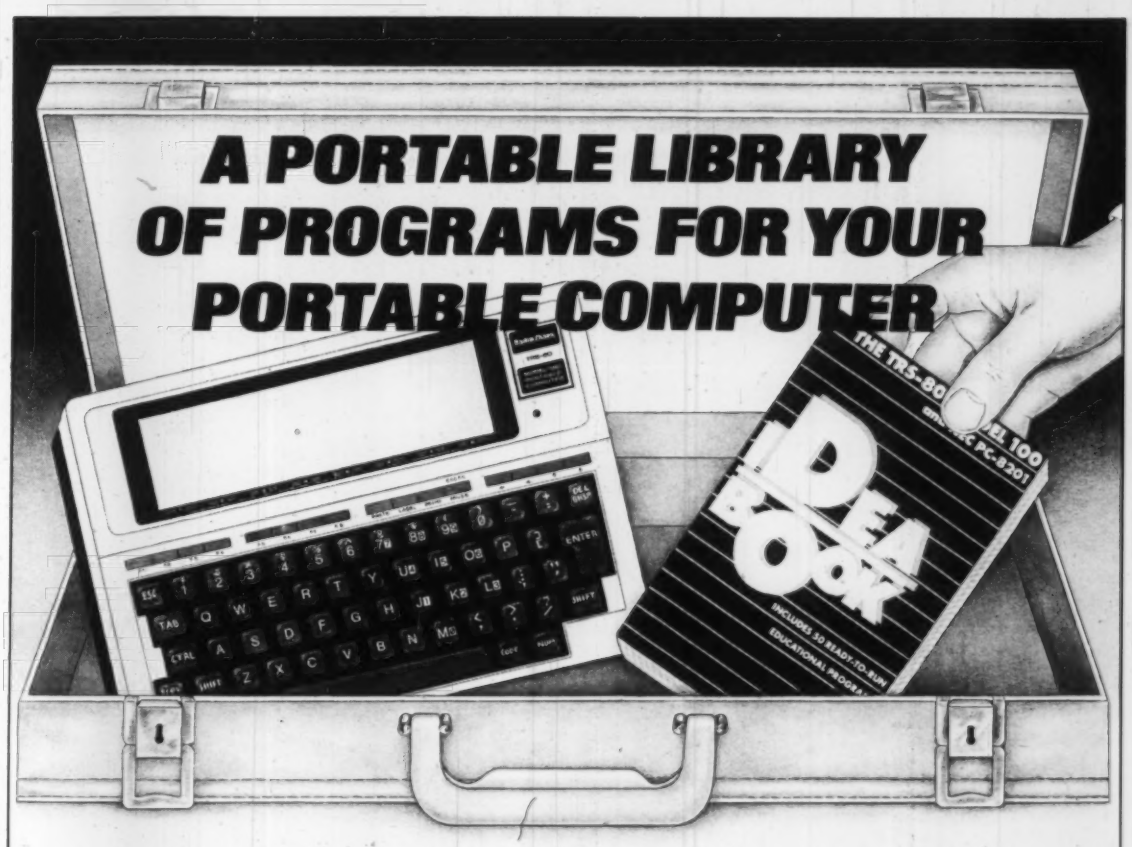

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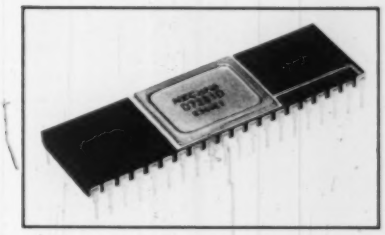
The First Non-Von Neumann Computer



The Editors of ASCII

NEC has developed the world's first non-Von Neumann microprocessor chip, an image pipelined processor uPD7281D, for the purpose of image processing.

The chip is only seven millimeters square, yet it has the capability of a much larger and faster processor. Moreover, the cost is only about $225, less than one percent of the cost of current computers dedicated to image processing. "Pipelined" refers to the design approach which permits setting at the beginning the commands for reading and processing the succeeding data. In addition, the pipeline can simultaneously process many commands; thus it is considered a non-Von Neumann design.

Currently, processors for image processing are built with ten or more separate printed circuit boards. These are replaced by this single "super LSI" chip. Circuit width is a submicroscopic 1.75 microns, and the chip contains the equivalent of 115,000 transistors.

Initially, the chip will be used for applications that require the processing of large amounts of image data at very high speeds such as weather satellites and resource research satellites. It is also expected that the chip can be used in certain aspects of the Fifth Generation Project.

Recently, NEC also showed the world's smallest satellite-borne computer, the OBC-1. The computer measures 22 x 17 x 7.7cm., weighs 2.1 kilograms, and draws five watts. In comparison to the IBM computer used on the space shuttle, the OBC-1 weighs one-third as much and draws one-tenth as much power.

The few specifications that have been published don't sound much different from a small personal computer: 16K CMOS static ROM (expandable to 32K), LSI cpu and memory. A special power strobe system applies power to the system only when it is required, thus cutting power consumption enormously.

New Hitachi 256K Memory Chips

Hitachi recently announced that it will start distribution of samples of a large-capacity, easy-to-use 256K pseudostatic random access memory (PSRAM) and a high-speed 256K electrically programmable read only memory (EPROM).

The PSRAM has the same pin arrangement as a static RAM and is as easy to use as one. The refreshing of the PSRAM is done through a control pin; because the chip incorporates a timer, it does not need an outside clock or timing signal.

The structure of both chips is 32K 8-bit words. A 150-nanosecond version of the PSRAM is priced at $250 and a 200-ns version at $218. Deliveries start in October. A 250-ns version of the EPROM is priced at $98 and a 300-ns version at $88; deliveries start in July. 完

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Second Japanese Miracle on the Horizon

日本の第二奇跡の誕生せまる

Christopher Mead

In recent years Americans and Japanese alike have grown used to the idea of a mature Japanese economy whose "miracle" growth of the late fifties, sixties, and early seventies has petered out. Observers from all sides see sluggish Japanese growth ahead—perhaps a bit better than that of other advanced nations, but nowhere near the former GNP growth rate of about ten percent a year. The miracle, by almost all accounts, is over.

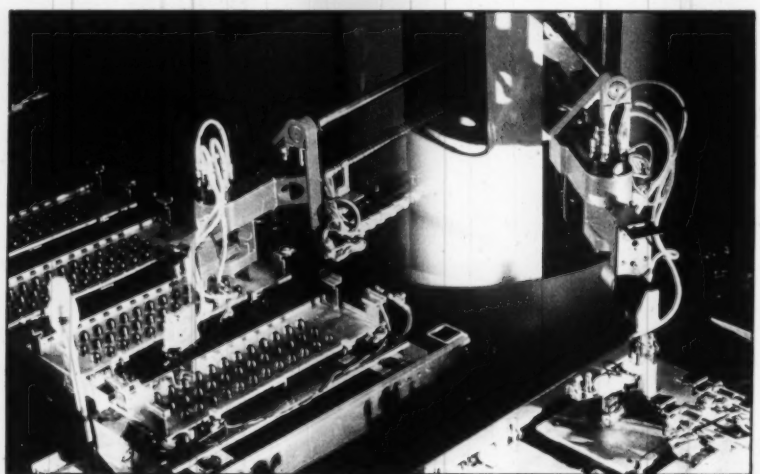
This view of Japan's economic future coexists with another view, equally prevalent, of the island nation's bright technological future. As Japan has taken the lead in consumer electronics, applied robotics and other forms of factory automation, photographic equipment, random access memory chips, supercomputers, and a host of other high tech fields, it has appeared to many that Japan is going to be the standardbearer of the 21st century. Ambitious projects such as the Fifth Generation Computer program and Nippon Telegraph and Telephone's Information Network System (INS) are good evidence of this leadership potential.

The critical question which few have addressed is: can the first view of Japan's future be reconciled with the second? Can Japan have a lackluster economy while making significant breakthroughs in more than a dozen high tech, commercially promising fields?

The answer is no. Japan's preeminence in these advanced industries will inevitably result in a new period of rapid economic growth. As Japan's computer, telecommunications, semiconductor, robotics, and related industries grow, they will carry the nation's economy along with them. Already these industries have reached the point where, for the first time, their export value is greater than that of Japanese automobiles. The new technologies are beginning to reinvigorate the Japanese economy—activity which shows no sign of slowing.

The secret to the high growth of the electronics and information-related industries is, of course, productivity. Integrated circuit memory costs are falling at more than 30 percent per year, and each price reduction has made the technology available for many new uses. Almost overnight, new products such as personal computers and videotape recorders have been born, and new industries like personal computer software publishing have emerged.

These new fields are not high tech



Japan leads the U.S. in industrial robots. Here, a specialized robot built by Oki Electric assembles Microline printers.

Christopher Mead is the editor of *Japan High Tech Review*, a Phoenix-based newsletter. He received his BA, Phi Beta Kappa, from Oberlin College and his MBA from Stanford University.

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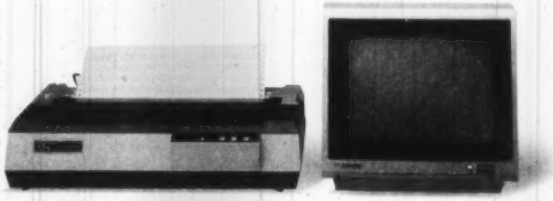

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abstractions; they are proven money makers. As the pace of innovation quickens and these industries advance further, their growth will transform the economy around them. In the same way that the economies of eastern Massachusetts and northern California have been lifted by microelectronics-related companies, so the economy of the entire nation of Japan will be lifted by similar activity.

It appears that the United States will lag behind Japan in extracting economic benefits from microelectronics technology. Japan has concentrated on commercially attractive technologies, while American researchers have devoted undue efforts to intellectually interesting projects of no monetary value. Many such projects have been commissioned by the U.S. Department of Defense, which clearly lacks the Midas touch: every year it turns $300 billion into objects of no economic value.

Other examples of the problem abound. While American researchers were racing to produce an "elegant," technically advanced 64K RAM chip, Japanese technicians slapped together a workable product and took the lion's share of the world market from the Americans. Similarly, the average American robot is more complex, expensive, and interesting than its Japanese counterpart, but Japan is far ahead of the United States in making robots that are suited to factory work.

Given the relative weakness of Americans in making money from their technology, it is no wonder that so many fail to see the economic implications of Japan's high tech industry. Yet it is time to realize that a new period of economic growth will emerge from the advances of the Japanese. Within five to seven years, Japan will begin registering annual GNP growth rates which match or even surpass those of any year since before the first oil crisis. Out of that growth will emerge a second Japanese economic miracle, which will have greater global impact than the first high growth period because the nation's economy will be so much larger.

The first economic miracle literally ran out of gas. Japan's old economy, heavily dependent on the automobile and other oil-dependent mechanical devices, could not withstand large oil price increases. The second miracle will be powered by microelectronics, which require very few natural resources. Relatively free of the danger of resource scarcity, Japan will therefore be free to lead the world into a resumption of the general trend which has been evident since the beginning of the Industrial Revolution—slowly, increasing GNP growth rates, which rise in parallel with technological advancement. 完

Japan No. 3 in Trading

David H. Ahl

With $147 billion in exports and $126 billion in imports, Japan continued to rank third in world trade in 1983. Exports were up 5.8% from 1982 but imports dropped 4.2%. The United States is the top ranked world trading power followed by West Germany.

In 1983, automobiles continued to be Japan's biggest export item, followed by steel, tape recorders (video and audio), and ships.

Japan's biggest import was oil, although it decreased to 32% of the total from 35% the year before. Imports of manufactured goods increased from 24.9% to 27.2%, the highest they have been since 1973 when they accounted for 30.6% of total imports.

Moreover, Japanese trading is continuing to increase in 1984. Exports of videotape recorders in February were up 55.5% from a year earlier and up 44.3% from January. Exports of color TV sets also rose 36.3% from a year earlier. Indeed, virtually every sector from shipbuilding to motor vehicles showed improvement from year ago figures.

The U.S. was Japan's largest export market during February. Export agreements with the U.S. jumped 99.6% from a year ago buoyed by large contracts for steel, textiles, chemical products, and metals.

Computer Imports From Japan Double

Imports of computer products from Japan more than doubled in 1983 to reach $1.5 billion. This is the first year in memory in which the U.S. has had a trade deficit in such products; the 1983 deficit was $696 million compared to a $65 million surplus in 1982. Japan is the only country in the world with which the U.S. has a negative trade balance in computer equipment.

The biggest increase in imports over 1982 was in computers and EDP equipment—the $819 million in imports

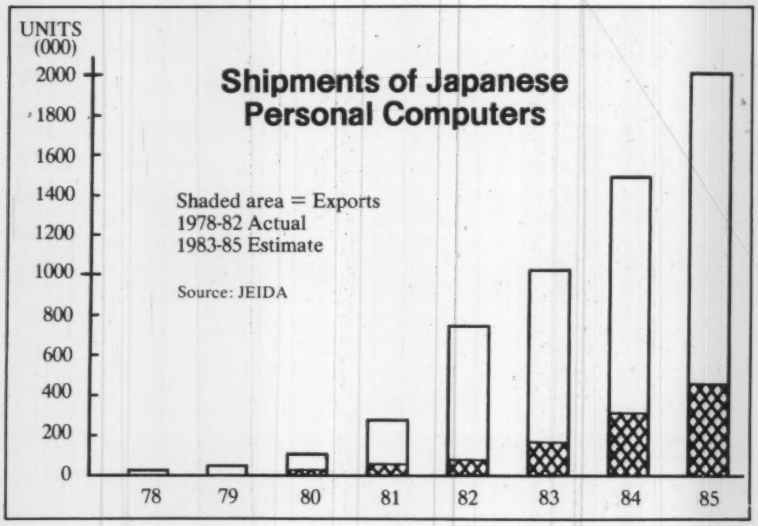
Actual and Forecast Shipments of Personal Computers in Japan

Year	Total Shipments Units	Total Shipments Value*	Export Units	Export Value*
Actual				
1978	9,976	$26	833	$2
1979	46,402	71	10,035	15
1980	110,610	150	16,836	23
1981	282,759	476	53,425	90
1982	762,166	1,028	79,115	107
Forecast				
1983	1,014,800	1,262	186,400	212
1984	1,491,800	1,673	326,200	321
1985	2,002,500	2,093	462,200	446
1990	5,407,600	4,427	1,818,100	1,398

* Value in millions of dollars (converted from yen at ¥225 = $1)

was triple the 1982 figure of $274 million. Imports of parts and subassemblies were up 63.5%, jumping from $433 million to $708 million in 1983.

In contrast, in 1983, U.S. exports to Japan rose to $828 million, up only 7.3% from the $772 million in 1982. Vico Henriquez, president of the Computer and Business Equipment Manufacturers Association said, "The trade figures point up the difficulty of U.S. firms to enter the Japanese market." However, he also conceded that much of the growth "reflected the increasing amount of OEM sales made to U.S. firms, who are becoming more dependent on lower-priced Japanese-built parts and subassemblies."



Is Japan Getting a Free Ride on Defense?

At the end of WWII, the U.S. forced Japan to disarm and adopt a constitution with low limits on military spending. Now, critics in Washington are complaining that Japan gets a free ride on defense while it concentrates on building its economy.

In January, the Japanese Finance Ministry proposed a defense budget of $12.5 billion, roughly one percent of the gross national product (GNP), the current ceiling. Although the Democratic Socialist Party, Japan's third largest, proposed that the government increase the limit, a move also favored by Prime Minister Yasuhiro Nakasone, it seems unlikely that this will happen.

Aside from diplomatic considerations, many military analysts in Japan are convinced that the modest increases in defense spending, about 5.1 percent per year, will put Japan far behind in its five year military plans. These center on goals such as developing the ability to protect sea lanes up to 1000 miles from the Japanese coast.

Foreign Minister Shintaro Abe says that American critics of Japan's defense policies focus too much on how much money is spent and not enough on "overall" Japanese efforts, such as foreign economic aid and other attempts to "secure peace." These comments reflect Japan's perennial quandary in its relations with the U.S.

In many respects those ties could not be better, but they are marred by persistent frictions over defense spending, and, to a much greater degree, over the trade imbalance between the two countries. The Japanese government often finds itself straining for a formula that contains enough concessions on these matters to calm American critics, but not so many as to create a political backlash at home.

Japan: America's Scapegoat?

"We should study the society of Japan and how they operate," said former Senator J. William Fulbright at a recent symposium. But he said Americans shouldn't slavishly imitate Japanese management and industrial techniques.

The U.S. should study Japan's success in world trade in order to help solve the trade deficit with that country. But, he said, Americans can't just do what the Japanese did. American industry should seek out principles that it can apply.

Fulbright noted that the Japanese mainland has few natural resources and only 10 to 15 percent of the land is suited to agriculture. To counter this the Japanese capably take advantage of the great resource they have as human beings.

Fulbright, former chairman of the Senate Foreign Relations Committee, said Japan had become America's industrial scapegoat because the Japanese do things so well. They outrank all other countries in education. "It's sort of embarrassing for Americans to admit that, but it's true," he said.

Yasushi Murazumi of the Japanese Embassy also spoke at the symposium at the University of Arkansas sponsored by the Fulbright Institute of International Relations. He expressed disappointment that many Americans regard the U.S. and Japan as economic adversaries rather than as leaders in the world technological revolution.

He admitted that the relationship between the two nations "is not trouble-free."

Tokyo has been under pressure from Washington to reduce the trade deficit in Japan's favor between the two nations by allowing greater importation of American goods. For months last spring, harsh words were exchanged between the two nations about Japan's unwillingness to increase citrus fruit and beef quotas as much as Washington wanted.

The Japanese market, Murazumi said, "is just as open as the market of the United States and is certainly more open than that of many European countries. The Japanese government has been working hard to open the market as much as possible and will continue to do so."

Computerization in Japan

The first computer was installed in Japan 27 years ago in 1957. Today, thanks to advances in semiconductor technology coupled with rapid economic growth, the penetration of computers in Japan is remarkable. At the end of 1982, the installed base of general purpose computers (mainframes) was approximately 122,000 with a value of $23.7 billion. Moreover, the current annual rate of increase is running over 20%.

Broken down by size, in terms of value, large computers account for 56% of the total; medium computers, 23.3%; small, 13%; and "supersmall" (under $50,000), 7.7%. In terms of units, the supersmall category accounts for 56.2%.

The industry employing the most computers by far is wholesale and retail trade. This is followed by the banking, electrical machinery, service industries, and government agencies.

The use of minicomputers is also growing rapidly, but, as in the United States, has been slowed somewhat by the astounding growth of the microcomputer market. Nevertheless, more than 11,000 minis were installed in 1982 with a value of $860 million, a growth of 7.5% over 1981.

The sales of full size office computers topped 65,000 units with a value of $1.6 billion, while the sale of desktop units exceeded 760,000 valued at approximately $1 billion.

By 1985, annual shipments of personal computers are forecast to top two million units with a value of $2.1 billion. It is expected that some 460,000 units with a value of $446 million will be exported, mainly to the U.S. MITI forecasts a tripling of these figures by 1990.

In Japan, the cost of hardware and software in a typical installation is nearly equal. Compared with Western countries, software is still undervalued in Japan. However, it is beginning to appreciate gradually.

Unlike the hardware manufacturers, the majority of software producers are small; enterprises with fewer than 100 employees account for more than 70% of the total number of firms. Fewer than 5% of the firms have annual sales over $20 million. These statistics show that the character of software development in Japan and the U.S. is similar—widely dispersed industry of small firms, each with a nucleus of talented people.

Where is the Future?

A recent report from JEIDA on computerization in Japan focuses heavily on the importance of communications in the future. It mentions Videotex, Teletext, and wide band picture information systems. Also, "digitization of communication networks will realize an integrated system digital network (ISDN) and offer services in voice, data, and images permitting new services beyond the realm of conventional communications."

Japan is just beginning to wrestle with the sticky questions of software protection, copyrights, and piracy. Currently, there are no laws or regulations that seem to apply. Indeed, the JEIDA report ends on the inconclusive note, "it is hoped that some means of protection will be established at an early opportunity." Sounds familiar, eh?

New Trade Rules for High Tech Products?

At the April meeting of the General Agreement on Tariffs and Trade (GATT) organization, Japan proposed that new rules be worked out on trade of high technology products. The proposed rules stipulate that GATT member countries cannot restrict imports of high technology products unless they can prove that the imports are disrupting and injuring their domestic markets.

Japan made these proposals in response to protectionist moves by the European Economic Community. The EEC doubled the tariff rate from 9.5% to 19% on Japanese-made digital audio equipment effective for three years beginning in January as a precautionary measure, even before the products have had any serious effect on European makers. Under GATT rules, a country is allowed to restrict imports only when the country finds its market is disrupted by sharp increases in such imports.

Japan hopes to prevent the spread of similar unilateral actions against other high technology products which it expects to become a major part of its international trade in the near future—*The Japan Times*, March 27, 1984.

Dynamic Asian Duo

Japan and China are destined to depend more and more upon one another. There seems to be an unspoken wish in Beijing and Tokyo for a firm economic alliance.

By forging these two nations into a network, China and Japan can make a mighty machine to challenge the United States, the European Common Market, and the Soviet bloc.

By infusing the potentials of China with the proven Japanese genius, the combination can turn into reality the dream of the East.

Unlike the United States, which is still wary of China, Japan is only too eager to sell its fanciest equipment to a neighbor hankering for the choice tools. What the Chinese can gain from their ethnic cousins is not only technological knowhow—such can be had from the Europeans—but also a model for the future, a role for which the Japanese are ideal—*Hong Kong Standard*, March 22, 1984. 完

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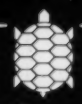

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Computer Training: An Overview

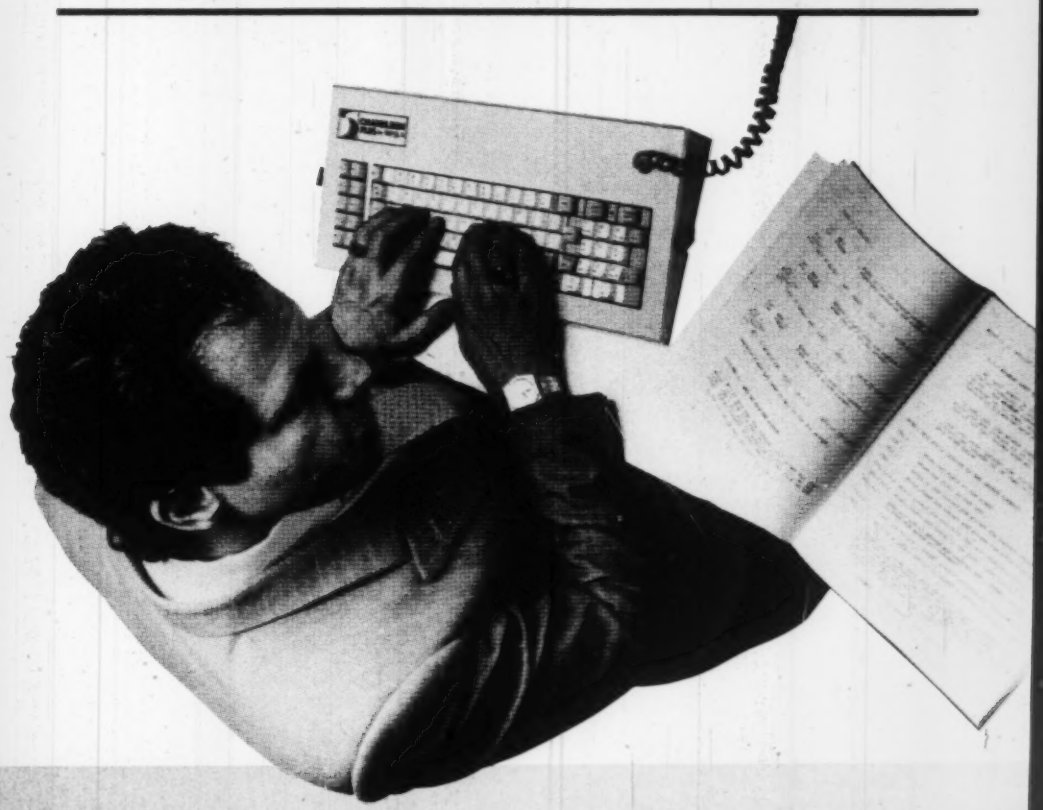
Computer Based Training for Non-Computer Subjects

Learning to Program

Training for Specific Applications

What to Look for in Training Materials

A GUIDE TO COMPUTER TRAINING MATERIALS



Computer Training: An Overview

GEORGE BLANK

For years people have been predicting that computers would take over education. That is beginning to be very much in doubt, but while we were waiting, education took over the computer market. There seems to be more training available on how to use a computer than there are computer based courses on how to do other things. There are now many ways to learn about computers.

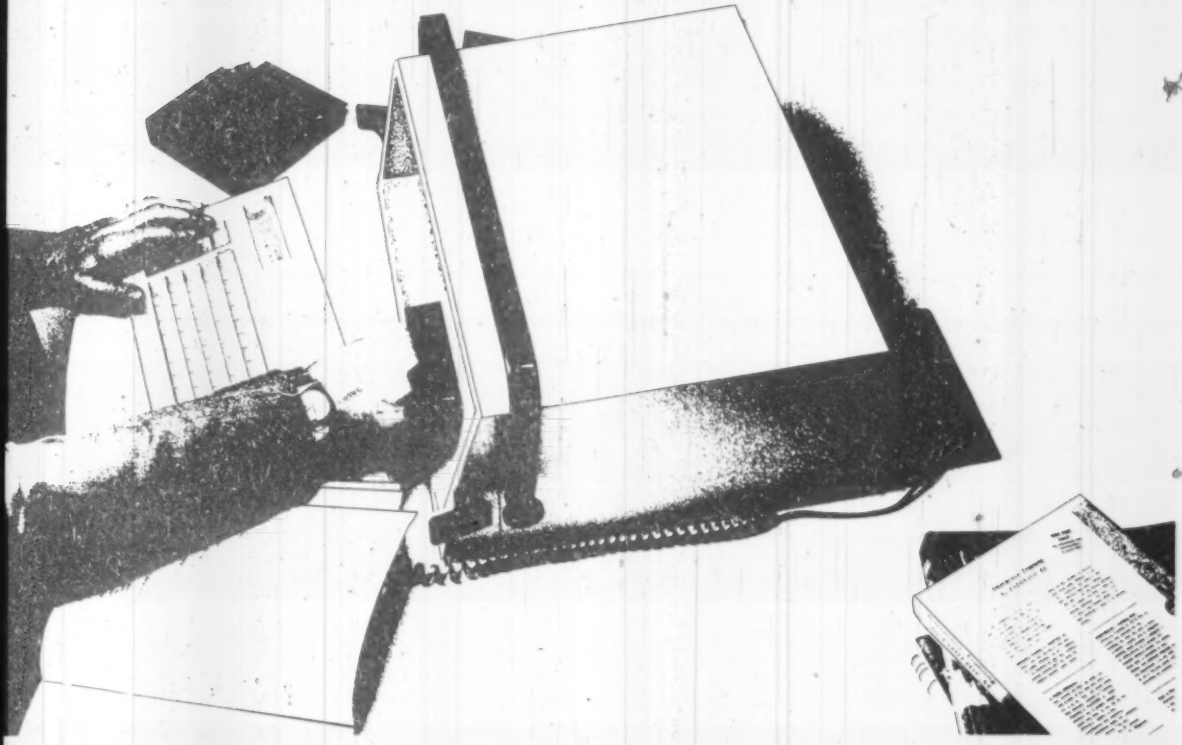
Many people like to learn in a classroom setting. Around the offices of *Creative Computing* in Morris County, New Jersey, we found many different courses available. Our local community college and several adult education programs at local high schools offer computer courses, as do many local computer dealers and some private schools.

The Executive Computer Network of Fairfield is a proprietary school specializing in training personnel from nearby large companies. They offer one-day beginner and advanced courses in *Lotus 1-2-3* and *dBase II* at $200 per person per day and a one-day course in *WordStar* for $175. They limit classes to 10 people and provide an IBM personal computer in the classroom for each student. The obvious advantage of this approach is the opportunity to obtain an immediate answer from a knowledgeable instructor if you have any questions. ECN also includes 30 days of telephone support after each course.

The Entre Computer Center in Pine Brook offers instruction on *WordStar* and *Lotus 1-2-3* at their store for $30 an hour, with a private tutor. They report that most of their students require two sessions of three hours each to reach proficiency.

Radio Shack Computer Centers also have classrooms. They offer about 80 courses ranging in price from $30 to $150 and have many more courses under development. Classes are usually limited to 16 students, with an average size of six to eight. The courses consist of one to four sessions of two or three hours each. Radio Shack will teach Basic to educators at no charge, and they have already given their Introduction to Basic course to more than 400,000 people. Their most popular paid courses are training on their *Scripsit* word processing, *Profile* database, and *General Ledger* programs.

One problem with computer application training is that most of the training is available for the applications that have sold the most.



That is only logical, and it may seem to be a good thing. Unfortunately, in computer software, best seller status is not necessarily attributable to quality or performance. The easiest way to become a best seller is to be the first adequate product. If a better product comes along in six months, you may have so much momentum that newer entries can never catch up. A recent study ranked *WordStar* in the bottom half of 22 word processing packages for the IBM PC, yet there is probably more training available for *WordStar* than for all the others combined.

DBase II is awkward to use, contains bugs, and reportedly even destroys files occasionally. It is not a true relational database and is quite limited in the number of files and records it can handle. Several of its more powerful competitors offer more stable code, better security, and better query languages. Yet *dBase II* dominates the training packages available for database systems. Of course, a complex product with foibles and idiosyncrasies requires more training than a well designed, easy to use product, so it may be in the interest of the training industry to support the older packages.

Many packages come with tutorial materials. Excellent examples are Perfect Software's *Perfect Writer* and *Perfect Calc*. Both applications allow two display windows on the screen, so the tutorials are set up to put the lessons on the bottom half of the screen while you work problems and experiment on the top half. These tutorials are so good that there is little need for other training.

A less enjoyable approach, and I think a less effective one, is taken by Lotus Development in their *1-2-3* tutorial disk. They also create a text lesson window on the screen, with actual worksheet displays in another window, but the lesson is canned and linear. You can type only what they tell you to type. Fortunately, with that approach, when you get bored, you can just hold down the spacebar and the program will do the typing. The Lotus tutorial is a good overview, but the lack of opportunity to experiment at appropriate points in the lessons makes it much harder to remember the material. I learned much better with the *Perfect Calc* and *Perfect Writer* tutorials.

In the sections that follow, we look at specific examples of computer based training under subject headings of application training, computer languages, and non-computer sub-

Overview

jects. One category of training software that is not included here is that which falls under the general heading of computer literacy. Basic overview packages, introductions to the keyboard, tutorials on disk operating systems, and programs that teach you how to type are available from many manufacturers and will be covered in a separate article in an upcoming issue of *Creative Computing*.

For the categories that are discussed, we have listed some of the packages available and the addresses of their manufacturers. A summary article discusses what to look for in training materials in general and applies to programs in the computer literacy category as well as those in the categories discussed in detail.

Most training materials focus on the IBM personal computer; it dominates the management market the way Apple dominates the secondary school market. Software publishers try to develop programs for large markets. Therefore, if you have a computer that is not covered, I apologize in advance.

I own computers from seven manufacturers and have access to several more at *Creative Computing*, so I would have preferred to cover more of them. But if most taxicab drivers had Apple Macintoshes in their cabs, only a foolish software house would develop taxicab routing software for the Osborne I! ■

Computer Based Training for Non-Computer Subjects

It is only natural to use the computer to teach people how to use computers. More creative use of the computer includes teaching other skills. I tested programs that teach engineers to analyze structural stress and strain, salesmen to sell, managers to write memos, musicians to compose, and pilots to use navigational instruments.

The Sales Edge

The Sales Edge is not advertised as a training program, but as a practical tool for salespeople. I am not convinced that it is a practical tool, but I do think it is a marvelous training device. You begin using *The Sales Edge* by answering a series of self-assessment questions. Then you create a customer file by answering questions about your customer. Then you have the program prepare a report that covers the following:

- What to expect from your customer.
- How to succeed with your customer.
- Preparation strategy.
- Opening strategy.
- Presentation strategy.
- Closing strategy.

Each of these sections is custom prepared to help a specific salesperson interact with a specific customer.

Since these are brief reviews, there is not space to give a full evaluation of *The Sales Edge*. However, this program will clearly teach a salesperson to be more analytical and more observant of customer needs and desires, and will teach him how to select and use appropriate strategies.

For example, I want my own sales staff to be effective closers. There are many different closing strategies, and most salespeople know only a few. *The Sales Edge* not only introduces new methods of closing, it even selects appropriate customers with whom to try the new strategy.

Earlier, I said that I did not think this was a practical tool for selling. This is because you must know a great deal about your customer, and the computer takes about half an hour to prepare a report. This may be reasonable for big ticket sales, but I think it unlikely that anyone will consistently go to that much trouble. However, even occasional use of *The*

Sales Edge will train a person to sell more effectively.

Thoughtware

Thoughtware is a series of computer courses in organizational development. I have seen much of this material before in other forms. I worked for a psychological testing firm as an undergraduate and for a management training firm as a graduate student, and covered some of the material in an MBA program and as a doctoral student in administration. Much of my training used tests and presentations similar to Thoughtware as a foundation for discussion. Since (1) Thoughtware does not offer as much explanatory material as I had in other courses, and (2) Thoughtware omits the human interaction of the discussion sessions, I ended up with the feeling that Thoughtware focused on the gimmicks of the methodology rather than the substance.

Assessing Personal Management Skills

I tried two of the packages in the Thoughtware series; their *Assessing Personal Management Skills Diagnostic* and their unit on *Leading Effectively*. The diagnostic package includes an assessment of leadership style obviously based on the Management Grid, and assessments of leadership strategy, understanding of motivation factors and work group effectiveness, feed back strategy, goal setting, and delegation based on comparing your answers with those of a broad sampling of managers nationwide and with your own subordinates. There are a few other tests and some explanatory material.

While this material may have limited use in individual study, I found it quite useful in my management consulting practice. I used the testing to explain to top management the pattern of interaction in a company. The Diagnostic Series of Thoughtware includes two other programs: *Evaluating Organizational Effectiveness* and *Understanding Personal Interaction Styles*.

Leading Effectively

I also had mixed feelings about the Thoughtware course in *Leading Effectively*. I am familiar with the military model of leadership training, as I experienced it in the U.S. Army's artillery officer candidate school. There, while some theoretical understanding of leadership was taught, the emphasis was on group interaction and learning by doing. Thoughtware begins by asking you to define leadership and analyze the effective leaders in your own organization. It covers the basic variables of influence: expertise, intelligence, perspective, charisma, politics, and persistence, and offers worksheets for assessing your own functioning in your workgroup. It then covers some conditions for leadership effectiveness: communication, teamwork, participation, initiative, support, setting standards and objectives, and measuring performance. You are then led through development of a personal action plan and a workgroup action plan. The management training series of Thoughtware includes five other programs, on motivation, defining goals and objectives, employee performance, time management, and conducting meetings.

I do not think that Thoughtware is appropriate for individual study. However, I do think that it can be used very effectively by a skilled group leader, and that it may also be somewhat effective in other group settings. My criticism is based more on the limitations of the computer than on the limitations of the Thoughtware material; this is a good supplement to management training, rather than good management training in itself. The cost is high; for $350 each for nine different modules, each designed to be used by one person, I think I would rather send my managers to Harvard's Advanced Management Program.

Wordscope

Wordscope, from Computer Action Learning, is a training program that concentrates on the five areas of writing and speaking that were found to be the most troublesome to managers: excessive language, word selection, unnatural language, organization, and style and structure. The full *Wordscope* program consists of a diagnostic exercise and five series of eight exercises each; one series for each of the five problem areas.

Except for the diagnostic exercise, which is a forced pair test, the exercises are presented in game format. For example, Unnatural Language covers writing in a simple and modern style. The eighth game in that series, Hotel New Jersey, is a detective mystery. You are presented with a memo containing several errors of unnatural language. As you search the memo and select better ways of saying things, you are shown the interior of different rooms in the Hotel. In the game story line, you search the hotel for the suspect who wrote the original memo.

Visual Stress and Strain

Kern International offers several packages intended for use in training engineering students in mechanics, structural analysis, and elasticity. The packages include *Visual Stress and Strain*, *Visual Statics*, *Visual Statistics*, and *Structural Analysis Software for Micros*. *Visual Stress and Strain* for the IBM PC was reviewed. The same package is also available for the Apple II and the Zenith Z-100.

Visual Stress and Strain includes

Training for Non-Computer Subjects

a manual and two programs written in Basic, STRESS2D and STRESS3D. The manual includes operating instructions, a tutorial review of the principles used in the programs, and line listings for those who want to modify the programs for special use. The two-dimensional stress program displays on the left side of the screen a square with the vectors of stress indicated by arrows and any entered data listed. The right side of the screen displays Mohr's Circle, a graphic depiction of the vector forces of the combined stress and strain. The numeric results of the calculations are also displayed, including the magnitude of the principal stresses, the maximum shear stress, and induced strains. If you enter an angle of rotation, the square is rotated on the screen and the calculations are redone.

The program does the calculations and displays the results. A student could have a difficult time understanding the effects of a single component, because a half hour of recalculation (including probable mistakes) could result from changing a single variable. These programs allow you to experiment by changing variables and observing the results while the computer does the calculations.

If we assume that it is the role of a professional engineer to understand what various forces do and how and why they operate, while it is the job of

SOME TRAINING MATERIALS ON NON-COMPUTER SUBJECTS

Title	Supplier	Format	Computer	Requires	Notes	Price
The Sales Edge The Management Edge The Negotiation Edge	Human Edge Software 12445 Faber Pl. Palo Alto, CA 94303 (415) 493-1593	Disk	IBM	CGB	CP	$250
Diagnostic Series (3) Management Training Series (6)	Thoughtware 2699 South Bayshore Dr. Coconut Grove, FL 33133 (800) THT-WARE	Disk	IBM	CGB	CP	$350/ program
Wordscope Diagnostic 1: Clutter 2: Language Selection 3: Unnatural Language 4: Organization 5: Style & Structure	Computer Action Learning 58 Harvey Dr. Summit, NJ 07901 (201) 625-8838	Disk	IBM & Compatibles	CGB		$ 50 $ 80
Visual Stress & Strain Visual Statics Visual Vectors Structural Analysis	Kern Publications 190 Duck Hill Rd. Duxbury, MA 02332 (617) 934-0445	Disk	IBM, Compatibles & Apple	CGB, BasicA		$ 85 $ 65
Air Nav Workshop	Space-Time Associates 20-39 Country Club Rd. Manchester, NH 03102 (603) 625-1094	Disk	Apple II/III		CP	$ 40
Songwriter	Scarborough Systems 25 North Broadway Tarrytown, NY 10591 (914) 332-4545	Disk	IBM, Compatibles Apple, Atari, C64	48-64K	CP	$ 40

Abbreviations: CGB—IBM Color Graphics Board; CP—Copy Protected; VCR—Video Cassette Recorder; C64—Commodore 64.

a machine to provide the mechanical and repetitive support necessary, these programs are ideal educational tools.

Air Nav Workshop

Aircraft navigation involves complex interrelationships among instrument readings, course headings, magnetic deviations, wind direction, and other factors. it is hard to teach, because pilots must be aware of many other factors required for safe operation of the aircraft at the same time they are trying to develop an intuitive understanding of factors related to navigation. Another major problem in all flight training is the high cost of flying time. Computer simulation has proven to be a very effective supplement to in-flight training.

Space-Time Associates offers the *Air Nav Workshop* to teach the safe use of aircraft navigation aids, particularly ADF/NDB (Automatic Direction Finder/Non Directional Beacon) and VOR (VHF Omnidirectional Rangefinder) equipment. The package consists of several programs for the Apple II+/IIe computers, including two simple programs to demonstrate the functioning of an ADF and a VOR.

The real heart of the program, however, is the Navigation Simulator. Here the screen displays an airspeed indicator, an elapsed timer, two VORs, and an ADF. The upper left of the screen displays a map of your navigation area, showing the position of your aircraft and various navigation aids in a simulated area 80 miles wide by 40 miles high.

The area map is divided into four quadrants, each of which is divided into four sectors. You can zoom in and out to have the screen display the area map, one quadrant, or a single sector at a time. There are more than 30 commands available to allow you to set your instruments, airspeed, heading, wind direction, and magnetic variance.

You can watch the flight path (visual flight) or have the computer store it in memory without displaying the aircraft (instrument flying) until you are finished. You can take off, fly any course you want, and land again. You can even place a landmark (perhaps your airport) on the screen and have the computer automatically calculate the bearing to two of the VORs. Each VOR station has identification letters, and the computer indicates them by sending Morse code through the speaker.

The package also includes a program that allows you to design and create your own navigation area maps with up to six VOR stations and three NDBs. A 55-page manual is provided, which in addition to giving instructions on the program, contains a tutorial on using navigation aids and reprints of several FAA handouts on navigation.

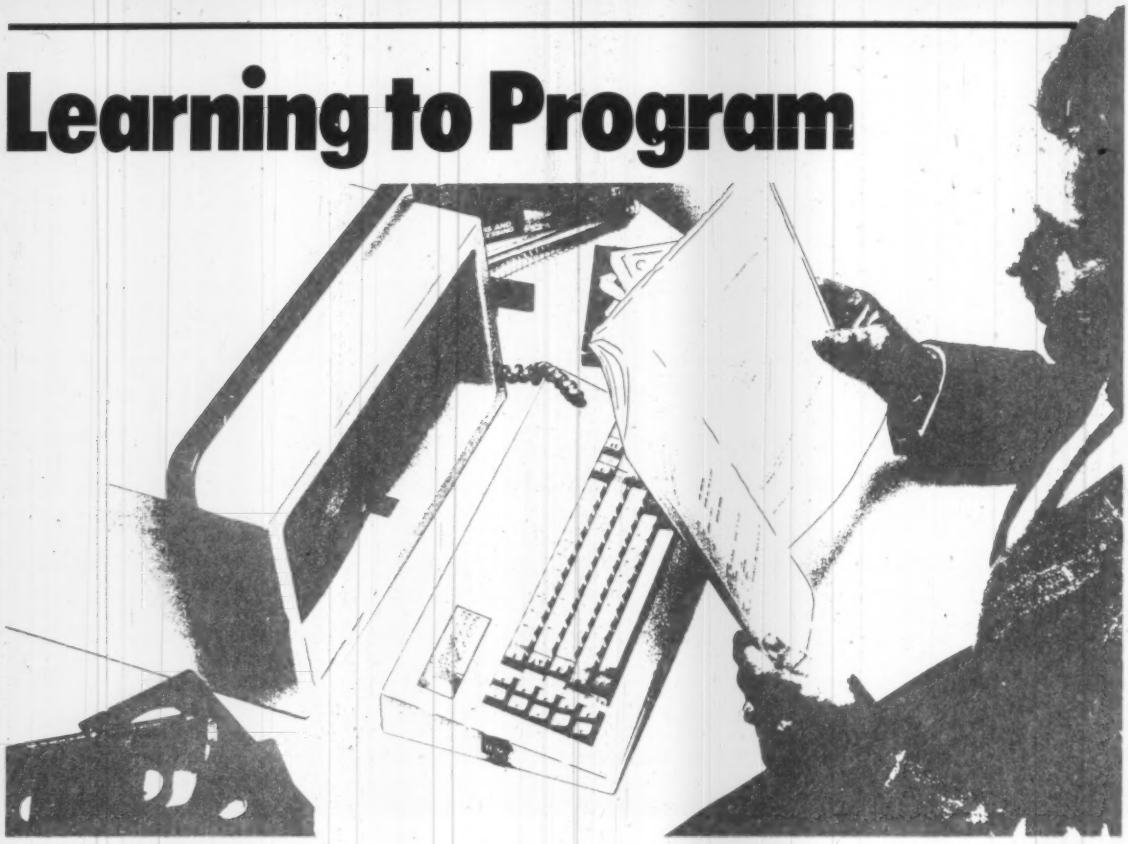
Songwriter

Songwriter, from Scarborough Systems, can turn almost anyone into a composer. The program functions as a player piano, displaying the notes on the screen as small blocks that move up the screen, sounding as they pass under the keyboard location. The time signature, length of notes and rests and a metronome are also displayed. You record a note by using the arrows to move to a particular key and pressing the spacebar. If it is not the note you want, you can erase it. Once you have recorded your notes, pressing P will play all the notes entered so far.

You can easily edit your composition. You can change the tempo, the length of a note, the note itself, add a rest or make other changes. While the program comes with a diatonic scale built in, you can load a pentatonic scale or even design your own scale. Each chapter in the tutorial manual contains a list of activities for teaching music composition.

Songwriter is a powerful package with many options. The reference card lists 59 commands. But you can use the program after learning only a few commands and learn the rest gradually. The manual is excellent, with lessons, activities, and a glossary. It even tells you how to take the music you have composed and add it to your own Basic programs. It is an easy and effective introduction to music composition. ■

Learning to Program



Only a few years ago, if you wanted to do anything with a microcomputer, you had to learn to program. Most people learned Basic, because most computers came with the Basic language and a book to teach it. Back in the May/June 1975 issue of *Creative Computing*, Stephen Gray began a six-part review of 34 books on the Basic language. Today, you can probably find more than that in the average shopping mall bookstore.

There are so many courses in programming available today—on audio and digital cassette, disk, videotape, seminar, and classroom—that it is nearly impossible to cover them all. In addition, there is very little need for most microcomputer users to learn to program in traditional computer languages. The main "programming languages" of today are spreadsheets, word processing programs, and database managers. So instead of reviewing the field, I have chosen to mention selectively some of the best books and a few aids to skill in programming.

If you want to learn Basic, I suggest that you use the book that probably came with your computer, for two reasons. First, the manufacturer usually provides a reasonably good book. Second, each version of Basic is unique, and the book that came with your computer covers your version specifically. I particularly like *Hands on Basic for the IBM PCjr* from IBM and *Getting Started With TRS-80 Basic* from Radio Shack. After you cover the tutorials, you should begin to write your own programs. Here I recommend David Ahl's book *Basic Computer Games* from Creative Computing Press. The games are short, primitive, and easy to type into your computer, and the graphics are minimal—exactly what you need as idea starters. Customize the games to take advantage of the graphics and sound available on your own computer, and add features from your own imagination; you will learn programming and enjoy yourself at the same time.

Some introductory computer literacy programs, such as *Knoware* from Knoware, Inc. and the *IBM PC Teach Program* from MLS introduce a little bit of programming in Basic. Cdex and ATI also have courses to teach Basic.

If you want to learn Pascal, I recommend *Oh! Pascal!* by Doug Cooper and Michael Clancy from W.W. Norton. For APL, the standard seems to be *APL: An Interactive Approach* by Leonard Gilman and Allen Rose, from John Wiley and Sons. If you want to learn C, you will probably use Unix, and most versions of Unix come with interactive lessons in C and Shell programming.

If you want to learn RPG II, Fortran, or Cobol, you are probably looking for commercially acceptable credentials, and I suggest you enroll at a local college, unless you can manage to get yourself hired by a company that is willing to train its programmers. I have long been dissatisfied with assembly language tutorials, and the only approach I have ever really liked was Heathkit's Continuing Education series. Actually, I have yet to see any Heathkit Course that was less than outstanding.

The real problem in programming is picking up the detailed knowledge of a particular machine

necessary to do advanced (read commercial) programming. Since the IBM PC is currently the most popular microcomputer for commercial programming, let's look at a few useful tools and references:

Peeks and Pokes for the IBM Personal Computer and *The Inside Track: Advanced Utilities for the IBM PC* are two collections of sample programs with documentation. They can save you hundreds of hours of research and trial and error programming. *Peeks and Pokes* covers system configuration, program protection, scrolling, DOS access from Basic and Pascal, keyboard processing, passing data between programs, and a few minor techniques. *The Inside Track* describes many ways of using DOS 2.0 from your own programs.

Inside the IBM PC, by Peter Norton, is an excellent reference to advanced programming techniques on the IBM PC. Norton has written similar books on the PCjr and the PC XT, as well as MS DOS and PC DOS: User's Guide. His software package, the *Norton Utilities*, is another gold mine of technical information.

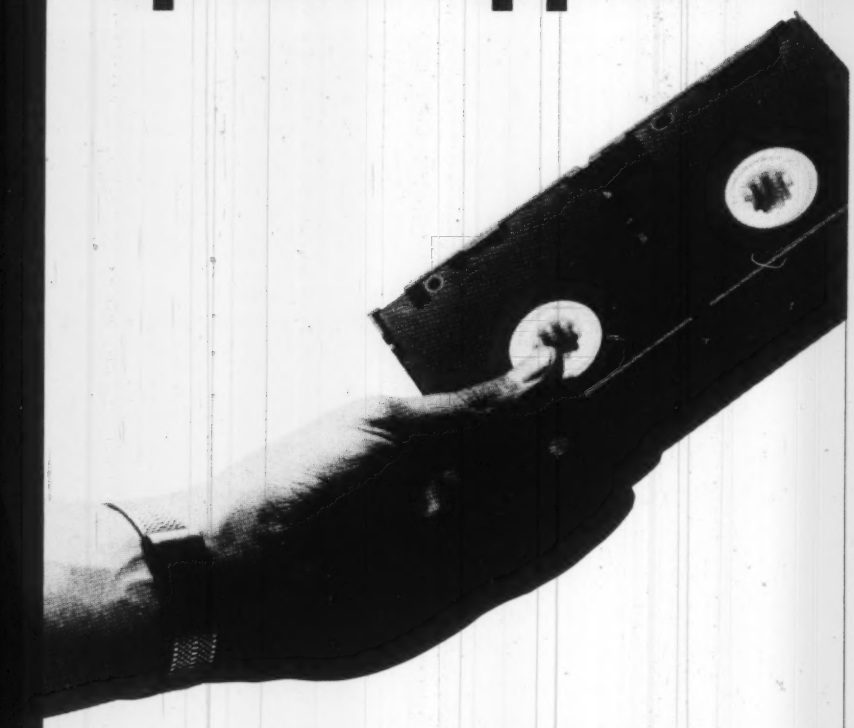
A machine language monitor is as essential to learning serious programming as a microscope is to learning biology. It lets you see and analyze what is going on inside the computer. The best monitor that I have seen is *Trace 86* from Morgan Computing Company. It is easy to use and allows you to monitor simultaneously the currently executing code with a disassembly, all twelve 16-bit registers, the flag registers, the stack and areas of memory in either single step or continuous operation. ■

TRAINING MATERIALS FOR COMPUTER PROGRAMMING

Title	Supplier	Format	Computer	Requires	Notes	Price
Teach Yourself Basic	Cdex Corporation 5050 El Camino Real Los Altos, CA 94022 (800) 982-1212	Disk	IBM		CP	$ 70
MBasic	American Training International 3770 Highland Ave., Suite 201 Manhattan Beach, CA 90266 (213) 546-4725	Disk	CP/M systems		CP	$ 75
Basic Microsoft Basic Cobol Pascal Fortran Assembly Language (8080)	Heath Company Benton Harbor, MI 49022 (800) 253-0570	Audio cassette and workbook	All systems	Cassette player		$ 45 $100 $150 $100 $100 $ 50
Trace 86	Morgan Computing 10400 North Central Exp. Dallas, TX 75231 (214) 739-5895	Disk	IBM, Compatibles			$ 75
Peeks 'n Pokes The Inside Track	Data Base Decisions 14 Bonnie Ln. Atlanta, GA 30328 (404) 256-3860	Disk	IBM, Compatibles			$ 30 $ 45
Inside the IBM PC MS DOS and PC DOS	The Brady Co. Bowie, MD 20715 (800) 638-0220	Book	IBM, Compatibles			$ 20 $ 16

Abbreviation: CP—Copy Protected.

Training for Specific Applications



The largest single category of computer training programs available is training for specific application programs. I used training programs from the manufacturer for Radio Shack's *Scripsit* and *Super Scripsit*, Perfect Software's *Perfect Writer* and *Perfect Calc*, and for Lotus Development's *1-2-3*. Also reviewed, from third party suppliers, were three different courses on *VisiCalc*, three courses on *dBase II*, and three courses on *Lotus 1-2-3*. These represent only a small fraction of the courses available. Cdex alone has five courses on *Lotus 1-2-3*; four each for *Multiplan*, *VisiCalc*, and *SuperCalc*; six for accounting packages, three on database management systems; four for word processors; and one on *TK! Solver*. ATI has a similar number of courses. Many of these courses are available in separate versions for the IBM PC and Apple computers.

Kathy Learns VisiCalc

The IBM PC and Business Software by James Kelly is a book that includes two disks with examples for *WordStar*, *VisiCalc*, and *dBase II*. This tutorial gives reasonably complete coverage of each of the three programs, covering even functions I have never needed. Frankly, the biggest drawback to this book is that, although all three programs are popular, there are better programs available in each category. I found the layout of the book unattractive, and I was easily bored reading a book that consisted largely of text for me to type into the computer.

However, the book, with 100 pages on *VisiCalc*, does go into much greater detail and covers more functions than either the MLS *Teach Program* for *VisiCalc* or the Cdex *Training for VisiCalc*. It is also significantly cheaper at $39.50. For one person on a tight budget who wants to become an expert at *VisiCalc* and is willing to work hard to do it, I recommend *The IBM PC and Business Software*. I do not recommend it to companies that simply want to train a number of people efficiently and inexpensively with minimal supervision. For such companies I recommend Cdex *Training for VisiCalc*.

Teach Program for VisiCalc from Micro Learning Systems, like their *IBM PC Teach* program, requires linear rote learning. I used it to teach an employee to use *VisiCalc*. Although she had been entering data into a *VisiCalc* template for months, she had never learned to create her own spreadsheets. It took her 50 minutes to complete the disk tutorial. Her understanding was then sufficient to recreate and modify our company model, with a little reinforcement from the Cdex course.

I should mention that she took the IBM PC version of *Teach Program for VisiCalc* and two lessons from the Apple version of Cdex *Training for VisiCalc*, and then went to use her training on the Radio Shack TRS-80. The only problem she encountered as a result of using different computers was the substitution of the CLEAR key on the TRS-80 for the ESCAPE key on the other machines.

Because the Cdex course is similar in approach to their *Lotus 1-2-3* training, discussed in the next section, I will not describe it in detail.

I Learn 1-2-3

I had a consulting job in New Hampshire, and on my way back home I stopped off at Lotus Development headquarters in Boston where I was treated to a demonstration of *Symphony*. I was overwhelmed by its power and shamed that I had never learned to use its predecessor, *1-2-3*. This gave me a perfect opportunity to try out several training packages.

TRAINING MATERIALS FOR APPLICATION PROGRAMS

Title	Supplier	Format	Computer	Requires	Notes	Price
Database (3 courses) Word Processing (6) Financial Planning (6) Lotus 1-2-3	American Training International 3770 Highland Ave., Suite 201 Manhattan Beach, CA 90266 (213) 546-4725	Disk	IBM, Compatibles Apple & CP/M		CP	$ 75
PC Communications (2) Word Processing (4) Spreadsheets (13) Accounting Packages (4) Data Base (4) Lotus 1-2-3 (4 courses) TK! Solver	Cdex Corporation 5050 El Camino Real Los Altos, CA 94022 (800) 982-1212	Disk	IBM & Apple		CP	$ 70 $ 60
The Power of VisiCalc ... Multiplan, 1-2-3, SuperCalc, VisiPlot	Management Information Source, Inc. 3543 N.E. Broadway Portland, OR 97232 (503) 287-1462	Workbook & template disk	IBM			$ 29
Teach Program for... VisiCalc Multiplan dBase II	Micro Learning Systems Reston Publishing, Inc. 11480 Sunset Hills Rd. Reston, VA 22090 (703) 437-8900	Disk	IBM		CP	$ 70
How to use 1-2-3 SuperCalc, Multiplan, Applewriter, Wordstar Easywriter II, VisiCalc	FlipTrack Learning Systems 999 Main St., Suite 200 Glen Ellyn, IL 60137 (800) 222-FLIP	Audio cassette	IBM Apple CP/M systems	cassette player		$ 75
The IBM PC and Business Software	Banbury Books, Inc. 37 West Ave. Wayne, PA 19807 (800) 345-8500 X49	Book, disk	IBM & Compatibles	Wordstar, VisiCalc, dBase II		$ 40
Software Primer Lotus 1-2-3 Level 1	JNZ Inc. 729 Windward Dr. Rodeo, CA 94572 (415) 799-1446	Book, disk	IBM & Compatibles	Lotus 1-2-3		$ 35
MultiMate, dBase II Lotus 1-2-3 (2)	Anderson Soft-Teach 2161 Blossom Valley Dr. San Jose, CA 95124 (408) 356-3552	Videotape	IBM & Compatibles	VCR		$195
VisiCalc, MultiMate dBase II, Lotus 1-2-3	Micro Video Learning Systems 119 W. 22nd St. New York, NY 10011 (212) 255-3108	Videotape	IBM & Compatibles	VCR		$195

Abbreviations: CGB—IBM Color Graphics Board; CP—Copy Protected; VCR—Video Cassette Recorder

I started with the training that comes with *1-2-3* from Lotus Development. While the instruction was linear without any particularly notable features, it was efficient and sufficient to enable me to use *1-2-3* confidently. It must also have covered the same material covered by the basic Cdex course, because I had no trouble continuing directly into the Cdex advanced course.

The Cdex course was also logically organized and effective. It covered more advanced features of *Lotus 1-2-3* in a way that allowed me to understand some features that I did not pick up in the other courses. However, for the first few days, I could not do the accompanying exercises. Whenever I tried to load them, I got the message Illegal File Format.

I finally guessed that I had an early version of *1-2-3* that required DOS 1.1, while Cdex supplied the exercises on a nine-track disk that could not be read by DOS 1.1. After copying the files onto an eight-track disk, I was able to read them. (I wonder how many of their regular customers would have figured this out?)

Even without the file incompatibility problem, it was awkward to switch back and forth between the Cdex disk, using the UCSD Pascal operating system, and *Lotus 1-2-3*, using PC DOS, for the exercises. You waste several minutes loading programs every time you switch. Primarily for this reason, I would not choose to use the Cdex program to train my own employees, although I do consider Cdex training effective.

I was prejudiced against the FlipTrack course, feeling that an interactive disk course should be much better than listening to a cassette. To my surprise, I liked the FlipTrack *How to Use Lotus 1-2-3* better than any of the other application training programs I reviewed. For one reason, hearing something as well as seeing it and doing it helped me to remember what I learned. I also liked working directly with *Lotus 1-2-3*, so that I could stop the tape at any time and experiment with the commands I had just learned. In fact, the tape message encouraged me to do just that at the end of many of the lessons.

The flip track concept—turning the cassette over for more advanced training on many of the topics covered—allowed me to decide how deeply to get into each topic. I liked that and chose to take the flip track about one third of the time. Although FlipTrack's pacing did not match my own, I did tend to keep going through the material to keep up with the tape, and I appreciated the extra motivation that created.

On a tape course, organization and presentation of the material are critical, and I felt that FlipTrack did an excellent job of covering the right topics in the right order, in sufficient depth and with adequate examples and practice. I think they did a better job of balancing these factors than any other training package I reviewed.

However, once I finished the FlipTrack course, I did not want to use it to review a concept. I think that the disk based programs are more effective for selective training, because you can use the menu to get directly to the appropriate topic.

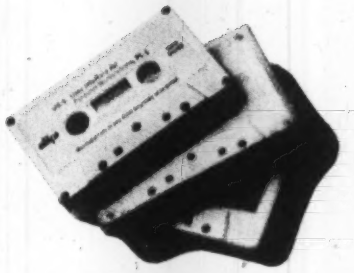
The Software Primer: Lotus 1-2-3 (Level I), from JNZ Inc., is a tutorial consisting of a manual and an example disk tutorial. It covers a wide range of basic *1-2-3* functions, taking the functions one at a time in systematic order. While Level I does not cover advanced topics like keyboard macros, which are covered in both the Cdex course and the FlipTrack course, it does give much broader coverage of the elementary functions, including such obscure ones as @DSTD and changing the default printer settings.

The manual comes in a nice free-standing easel binder that makes it easy to use. It is not typeset, but is clearly printed with a letter quality printer in an appropriate type size and with judicious use of overstriking for boldface. I consider this a good way to learn to use *1-2-3*, like using *1-2-3* directly, and like the easel format. I don't particularly enjoy using a book to learn, although it is comprehensive and cost effective. I assume that their forthcoming Level II of the same tutorial will cover the advanced features. This book is much better for reference purposes than the Cdex course, although, frankly, the function reference section of the Lotus manual is better than either of them.

All are effective. So which course should you buy? First of all, except in a corporate training center, use the tutorial that comes with *Lotus 1-2-3*. Then, if you can set aside time free from distractions and want to learn *1-2-3* quickly and in depth, get the Flip Track course. If you want to maintain tight control over your company's training, carefully schedule the use of computer time, and efficiently teach a standardized, moderate level of functioning to groups of people, the Cdex course is a good choice. If control of the training environment is less important, and you want to encourage some experimentation, *The Software Primer* is also good. Finally, once you have taken any of the courses, move the Appendices and the Index to the front of your *Lotus 1-2-3* manual and use the "1-2-3 Function Reference" appendix as your main learning tool.

Training for dBase II

We have yet to hear from one of the major players in the training market place. ATI and Cdex are locked in battle for primacy in corporate interactive computer training.



I used the ATI *dBase II* course.

The ATI materials are ruthlessly efficient. They offer straight linear coverage of the bare minimum of material necessary to use the application program. You must type exactly what the course tells you to type when it tells you, except that you can mix upper- and lowercase. Any other deviation leads to an error message.

I was pleased with the brevity, for I found these the most boring training materials I reviewed. Most topics are covered with only one example in the tutorial. But you can learn enough in three hours to do a great deal with *dBase II*, and the ATI manual is organized to refresh you on any covered topic in 30 seconds, eliminating the need for depth of coverage in the tutorial itself.

Since ATI and Cdex are major players, some comparative comments are in order. While I had only the *dBase II* course from ATI, I had three courses from Cdex, among which was their *dBase II* course. The *dBase II* course covers approximately the same material as the ATI course. However, it covers it in more detail, with solid explanations before each concept. The Cdex course also allows more freedom in entering information for exercises; allowing you to define your own headings, for example.

A further feature of Cdex is testing immediately after each section, usually true/false, so that you can verify that you learned the material. Cdex also offers practice sessions, supplied on a data disk, to provide some hands-on training. I felt that I knew more after a Cdex section than after an ATI section, but of course it also took more time. While the Cdex manual is also a good reference to *dBase II*, I felt that the ATI manual was easier to use; sufficiently so that I preferred it for support until I gained confidence with *dBase II*.

In short, I rate the programs a toss-up; ATI is probably the best course if you are highly motivated and in a hurry to learn, while Cdex is better if you need a slower pace and more explanation. I think both courses follow a factory approach—little creativity, nothing exciting—but both offer well organized, competent, and effective training.

As was true with *VisiCalc*, the Banbury book, *The IBM/PC and Business Software*, goes into significantly more detail than either of the two courses and includes worthwhile practice on a useful program as well. That program keeps track of registration cards for a business product and uses them to set up a mailing list and do sales and marketing analysis. This is a practical approach that goes beyond the Cdex practice exercises. This book is probably the best choice for an individual who wants to learn *dBase II* inexpensively and in detail at his own expense, while the interactive courses are better for corporate purchase.

Advanced Training for MultiPlan

The Power of MultiPlan, from Management Information Service, is a book that teaches the sophisticated use of *MultiPlan* by working with several applications provided on a template disk. The applications are invoicing from inventory, accounts receivable, cost recovery, check ledger, manufacturing estimating, daily inventory, accounts payable, payroll, commissions, and a consolidated production schedule.

The templates are intended mainly for training, but could be adapted to business use. Working through the exercises in the book will lead you to a thorough understanding of *MultiPlan*. I like having useful templates to work on, rather than having to type everything myself.

Radio Shack Word Processing

Radio Shack provides an audio cassette course with a workbook and a disk containing example text as an integral part of their word processing programs, *Scripsit* and *Super Scripsit*. I used *Scripsit* for years and trained more than 50 employees to use it, and I never felt the need for the tapes, although two or three employees have used them. Normally, I would give ten minutes of instruction to a new employee, then let him practice for a while. The next day I would give another ten minutes of instruction, and after that he could usually do what he needed, looking up other information on the reference card or asking questions of other employees.

The same is not true of *Super Scripsit*, which is a more powerful and more complex system. Here the tape course is necessary to train an employee with orderly and systematic coverage of the material. While we use *Scripsit* for letters, memos, and magazine articles, *Super Scripsit* is used for writing books and software manuals, requiring larger files and more complex formatting. The cassette course comes with eight lessons on both sides of four cassettes and a large looseleaf binder for printed instructions. It takes about an hour per lesson, and I generally have employees study one lesson a day for eight business days. Since the course is multisensory, with audio, visual, and manual components, and the materials on disk, tape and in the workbook reinforce learning, it is very effective. I wish that I didn't have to pay a employee for ten or 12 hours of work to learn the system, and I would prefer a program that did not crash and destroy files as often as *Super Scripsit* does, but I cannot complain about the effectiveness of the training. ■

What to Look for in Training Materials

Educational Value

How do you evaluate training materials? The most important question to ask is whether the specific training materials available meet your objectives. Do the materials cover the information you need to learn or teach? Are the materials efficient, saving time and money? Do the materials adjust to the needs of individual students? Do the materials provide "hands on" training, developing actual skills rather than just awareness? Can the training be translated into effectiveness on the job? Are the materials self motivating, encouraging those using them to stick to the task and learn? Are the materials self pacing, adusting to the user's learning speed?

Not all computer based training uses valid educational approaches. Some of the worst recent educational mistakes are being repeated in computer software. Most such failures come about because the material is not self motivating, hence boring.

For example, the paper based frame instruction of the 1960s was a failure. Yet much of today's computer based instruction uses the same boring and ineffective format: present a little information, test a little, and move on to the next frame.

From film and television, we have learned that one of the most boring formats is the "talking head," which requires you just to look at a picture of someone talking. Yet when amateurs create video training materials, talking heads predominate. Perhaps the worst example of talking heads is in the Thoughtware programs. If a talking head is bad, why not make it even worse by doing a poor imitation and animating a talking head? That is just what Thoughtware did.

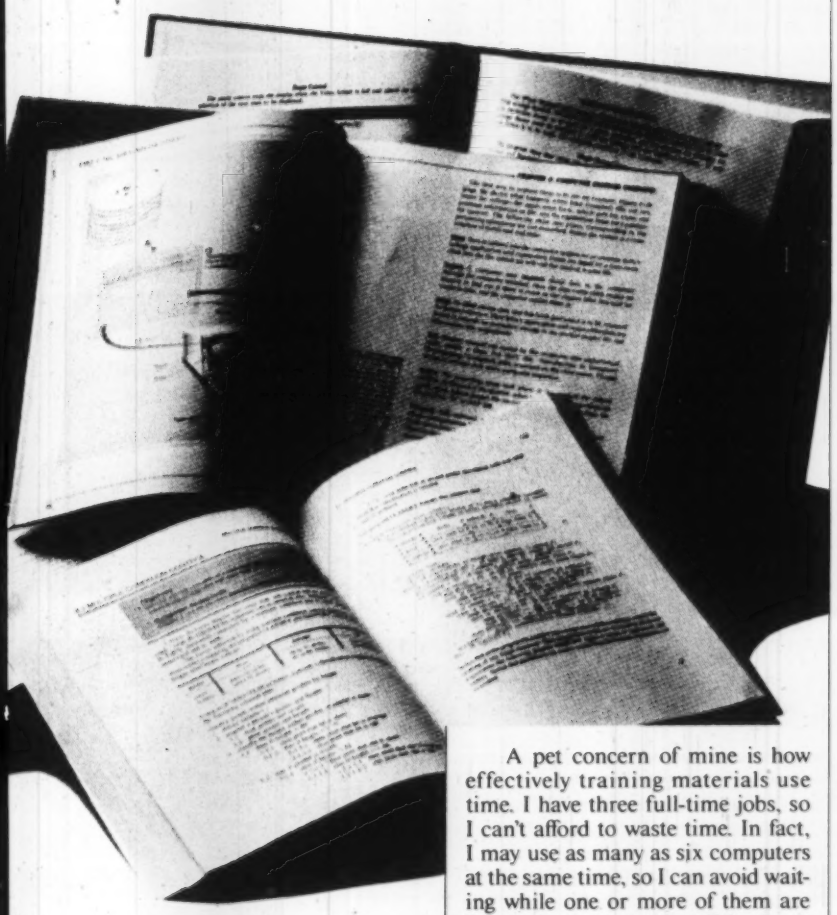
It is important to recognize that human learning is a creative process. Children learn one of the most difficult and challenging skills, using their native language, before they are even old enough to go to school. They learn in many creative ways, starting at birth. Human interaction is a vital part of the learning process, not only for children learning to speak, but also for adults learning job related skills. Computer training necessarily lacks this interaction. In some cases, particularly in the Thoughtware materials, this reduces its effectiveness.

Some instructional material is excessively cute. When a teacher succumbs to the temptation to show off, education suffers. Sometimes good instruction must draw a fine line between boredom and distracting gimmicks. Entertainment can add motivation and make some concepts unforgettable, but it is important to ask whether the entertainment value illustrates and aids retention of the material or just distracts.

There is a tension between systematic coverage of a topic and the freedom to experiment and be creative. In general, linear instruction, the most direct way to "cover" a subject, is boring. On the other hand, without structure, students may decide to concentrate on material that is interesting but of little value and never learn essential skills.

An excellent example of the tension between linear instruction and creativity is the contrast between the tutorial programs supplied with *Lotus 1-2-3* and with *Perfect Calc*. *Perfect Calc* allows two display windows on the screen, and the tutorial is set up to put the lessons on the bottom half of the screen while you work problems and experiment on the top half of the screen. These tutorials are so good that there is little need for other training.

A less enjoyable and less effective approach is taken by Lotus Development in their *1-2-3* tutorial disk. Lotus also creates a lesson window on the screen, with actual worksheet displays in another window, but the lesson is canned and linear. You can type only what you are told to type. If you try to be creative, possibly by changing the numbers in a spreadsheet example, all you get is an annoying beep as the program rejects your keystrokes. The Lotus tutorial gives a good overview of the program, but the lack of opportunity to experiment at appropriate points in the lessons makes it much harder to remember the material. I learned much better with the *Perfect Calc* tutorial. *Perfect Writer* also comes with an excellent tutorial in the same format.



Cost Effectiveness

Most of the instructional materials described here are competent and cost effective. Even if you disregard travel time and non-instructional expenses, for the tuition cost of sending one manager to a one-day course in using *Lotus 1-2-3*, a company can buy an instructional package that can be used by a dozen managers.

A pet concern of mine is how effectively training materials use time. I have three full-time jobs, so I can't afford to waste time. In fact, I may use as many as six computers at the same time, so I can avoid waiting while one or more of them are formatting and copying disks, loading programs, or compiling and printing.

I am very intolerant of time wasting training programs. The Cdex *VisiCalc* course on the Apple annoyed me because it takes three minutes to load the program, get through the titles and menus, enter your name, and get to a lesson. In addition, the course comes on three disks, and each one must be loaded separately. If you take each lesson separately, you will waste 45 minutes of your training time just waiting for the lesson to load.

Thoughtware is even worse. The program consists of many individual frames that are loaded as separate Basic programs. They use a long complicated menu framework to get to the training, so you might have to wait for ten programs to load before you even reach the current lesson. Their "talking heads" screens also require a lot of set up time for the graphics routines.

Although I have just stressed the amount of time that can be wasted by a training program, it is important to remember that for the most part they *save* time. When an employee needed to be trained in *VisiCalc* replication, it only took three minutes to locate and set up the same Cdex course I complained about above. The training was completed in half an hour. This does not begin to compare with the time it would take either to send someone to a training course or to prepare an equally effective demonstration. There was no time wasted for travel, expense documentation, meals, or even non-essential parts of the training. The Cdex materials provided exact coverage of the specific training needed on a demand basis.

Another key element of the effective use of time is pacing. Most of the disk-based materials move to the next screen when you press an appropriate key. Like a book, where you turn the page, these courses are self pacing. You control the speed. Cassette-based courses, like Fliptrack Learning Systems, are somewhat less flexible, if only because you must start, stop, and rewind the tape. But in general, when I did not make typing errors, I could keep up with the course without stopping the tape, and I often found myself waiting for the tape to catch up with me. When I made a mistake, I had to rewind the tape a little.

What to Look for in Training Materials

Computer System Problems

In computer software, support is vital. I encountered problems in several packages. Thoughtware identified and arranged for the replacement of a defective disk over a toll-free telephone line. Other companies list user-paid phone numbers for support.

Make sure that you have the right hardware configuration to use a training package. Even the most compatible of the so-called "IBM compatible" computers can have problems. Even with IBM equipment, what type of monitor you have, whether or not you have a printer or graphics board, how much memory you have, and what DOS you are using can determine whether or not you can use a particular software program.

Software protection adds to compatibility problems. For example, IBM puts part of its Basic in ROM. The compatible computers put the same parts on disk. If a company writes its training materials in Basic, and leaves just enough memory on the disk for IBM's DOS and Basic, there is not enough room for anyone else's Basic. If the files are copy protected, you can't split the files between two disks to solve the problem.

Most training software comes from relatively new companies, and they are making mistakes. For example, the material on the Cdex *Advanced Lotus 1-2-3 Course* data disk will fit on a single sided eight-track disk. Yet they provide it on a double sided nine-track disk, making it unreadable on systems using either single sided drives or PC DOS 1.1.

In general, if you have a recent IBM PC with two double sided disk drives, a color graphics board, an RGB monitor plus a monochrome board and a monochrome monitor, an IBM Epson graphics printer, 256K of memory on the motherboard, no hard disk, no extra memory, and no function boards, and you have copies of PC DOS 1.1, 2.0, and 2.1, most IBM PC software should run on your system, as long as it was not intended for the IBM PC XT. If you have a different computer, you'd better check first.

Special Advantages of the Computer for Training

There are some approaches that work very well on the computer. The computer can give us an overview of the world, focus in on a process as a microscope does, personalize instruction, use visual analogy effectively, simulate an activity under user control, and provide dynamic graphics.

The overview is illustrated by *Air Nav workshop*. Like a god, the user can create his own worlds and then look down from above on the flight path of the aircraft and observe the corresponding readings on the instruments. It is even possible to move the plane sideways or backwards to examine the effects.

The microscopic approach is used by *Songwriter* and *Trace 86*. In *Songwriter*, you can dissect a piece of music and examine it one note at a time making any changes you desire. *Trace 86* lets you do the same thing with an assembly language program. Both programs offer a great deal of detailed information that can be examined at the user's discretion.

The Sales Edge is a state-of-the-art demonstration of personalization of instruction. You answer a personalized questionnaire, then describe your client. The response of the program is then customized to the needs of both salesperson and customer.

Understanding is often enhanced by analogy. A computer can use a visual analogy to help a person learn an intellectual process. The *Wordscope* program uses this method extensively. For example, in one exercise, as you build a memo, you watch the construction of a skyscraper on the screen. Your progress is mirrored in the construction of the building.

Another effective visual process is graphing. The Thoughtware programs do a good job of presenting information in chart form. Bar graphs, pie charts, and other visual graphics illustrate relationships between pieces of information.

Probably the most uniquely effective computer technique for instruction is simulation. Most of the programs described under the computer literacy and application training sections simulate the action of the computer in response to user input. *Air Nav Workshop* goes further, simulating the response of aircraft instruments to a user manipulated environment.

The computer is also useful in relieving human beings of repeated calculations when they are needed to give an overview of a mathematical process. I cannot imagine an engineering student making many small changes to a structural stress problem, then manually recalculating all the equations to compare the effects. But that recalculation is done by the computer in the *Visual Stress and Strain* program, and it becomes easy for the student to observe the relationships.

After six weeks of intensive analysis of different approaches to computer based training, I have come to some firm conclusions. Most importantly, computers do not currently provide a rich enough environment to take a dominant role in education. We still need human interaction, physical models, tactile stimulation, and richer visuals than the computer can provide. But I am also convinced that we cannot ignore the special abilities of the computer described above. While the computer should not replace the teacher, it is at least as important as the blackboard in education. ■

Teamwork and Competition: How the Japanese Computer Industry Has Developed

日本コンピュータ産業の影にチームワークと競争

William G. Ouchi

There really is no news in the idea of advanced artificial intelligence and no great surprise in the idea that computer science will soon be successfully combined with the life sciences and the social sciences in the computers of the future. Similar efforts have been under way in the U.S. for nearly two decades.

A cynic might even say that all that the Japanese have done is to package their research well and to give it a catchy name: The Sixth Generation Computer. Others would predict with confidence that the Japanese will meet their Waterloo on the Sixth Generation project, so intractable are its barriers.

Japan has begun to develop the Sixth Generation Computer, a more advanced intellectual machine than the Fifth Generation Computer... It has a learning ability and communicates in human language. The Fifth Generation will be able to deduce from data that are entered, but this machine will be designed to function like a human brain... The subcommittee on artificial intelligence, which is under the supervision of the Aeronautics and Electronics Discussion Council has prepared an interim report... the discussion council has defined the Fifth Generation computer as "logical artificial intelligence" in the interim report and said, "we should develop a more human-like computer by utilizing psychology, cerebrum physiology, and linguistics." Based on this report and the study of the Watanabe Memorial Foundation, the Science and Technology Agency is planning to start development by summoning specialists in neuroscience, linguistics, psychology, and researchers in computer systems, including members from private companies.

Story from the
Japan Economic Journal
(Nihon Keizai Shimbun)
January 6, 1984

William Ouchi is Professor of Management and Vice-Chair of the Graduate School of Management at UCLA in Los Angeles, CA. His first book, *Theory Z*, on the New York Times best-seller list for more than five months, described the applicability of Japanese management techniques to U.S. companies. This article is based on his new book, *The M-Form Society: How American Teamwork Can Recapture the Competitive Edge*, which was published in May 1984 by the Addison-Wesley Company, Reading, MA. This book is based on a three-year study of the nature of the business-government relationship in the U.S. and Japan performed by Professor Ouchi and a team of 15 scholars at UCLA.

Yet, each of these criticisms has a faintly troubling ring of familiarity.

Many of us remember that the "so-called Japanese threat in semiconductors" would never materialize because the industry calls for a swiftness and boldness in management that the supposedly group-oriented Japanese could never muster. We remember that Toyota and Nissan would never seriously challenge GM, Ford, or Chrysler. Some of us even remember that Japanese-made goods were cheap and shoddy.

Japanese industry seems to have found a formula for success, and it may be applying that formula to its computer industry. No one can dismiss that record lightly; no one in the United States can afford to miss any lessons which we might learn from that success.

Our study would not be uncritical: The Japanese formula is not unerringly on target. A large scale effort to develop an electric automobile has failed to reach its goals, the steel and shipbuilding industries of Japan are now experiencing serious troubles, and Japanese computers have yet to make a dent in the U.S. market.

If we wish to sit in judgment on Japanese industry then we must find that it is not invincible, not failure-proof, its managers not morally superior to ours. If, however, our goal is not to judge but rather to learn how to improve ourselves, then we have much to learn.

The Japanese Formula

What is the Japanese formula for high

technology success? Each of us has his own answer to that question. Not only is the debate a favorite topic for after dinner conversation, it has also become a serious political debate. During the past two years, members of the U.S. Congress have introduced nearly three dozen bills, each of which reflects one or another theory of how the Japanese have succeeded and therefore of how we should respond.

One theory is that the Japanese have succeeded through protectionism embodied in tariffs and in more subtle non-tariff barriers to U.S. goods. The appropriate remedy, if you believe such a theory, is that we should teach them a lesson by responding with tariffs of our own and thus force them to lower their trade barriers.

If we wish to sit in judgment on Japanese industry, then we must find that it is not invincible, not failure-proof, its managers not morally superior to ours.

A slightly different version of this theory holds that protectionism has allowed domestic Japanese companies to build up their competitive strength in a protected home market, after which they invade the U.S., European markets, and the rest of the world. If you believe this theory, then the appropriate remedy is also to raise trade barriers, protect the U.S. auto companies, the textile companies, the steel companies, and give them time to rebuild their strength. This point of view has many adherents, but it has failed to persuade our lawmakers except in a few exceptional cases, because no matter what variation on the theory you believe, the remedy is the same: the U.S. should erect trade barriers. That remedy, most of us believe, is unacceptable.

It is unacceptable because trade barriers against foreign products simply mean that the U.S. consumer pays more for the protected domestic products. It is unacceptable because the U.S. economy is now derived 14 percent from trade, a figure above that of most European nations and moving close to the 17 percent of Japan. Protectionism would invite retaliation, so it is not the answer for us.

A second theory of the Japanese success has to do with finances. Basically, this view holds that the Japanese government keeps the interest rates paid to savers artificially low, is able to control bank lending decisions, and funnels low cost loans to targeted industries. These targeted industries can then unfairly compete with U.S. companies by charging lower prices for their computers and other goods because their cost of capital is heavily subsidized.

Those who hold such a view have introduced proposed legislation in the U.S. Congress which would establish an official U.S. Industrial Bank. This bank would benefit from huge tax advantages that would enable it to make low cost loans to industry. Proposals of this sort have met with massive disinterest in Washington, because everyone there understands that someone, some committee, politician, or bureaucrat, would get to decide who received these cheap loans and who did not. No one in America has confidence in any such form of central planning to make wise decisions. Instead, it is likely that such a bank, were we to create one, would instantly become the prisoner of interest group politics and that the result would not be good.

The third popular theory of Japanese industrial success involves central planning. This view holds that the Japanese Ministry of International Trade and Industry (MITI) knows all, sees all, and tells Japanese companies just what to do. The companies, in this theory, may complain a bit, but in the end they go along. Those who believe such a theory have suggested that we in the U.S. should create a federal super-bureau which would have the power to coerce our companies into going along with industry development plans which the analytical staffs of our new super-bureau had cooked up.

This approach has also died in Washington. It has died because our system of free enterprise is incompatible with any form of central planning, and it has died because very few of us have any confidence that our bureaucrats would make effective central planners if we let them try.

None of the three popular theories of what the Japanese Formula might be seem to hold water with the American public. In each case, we conclude that if that is what the Japanese are doing, it is not for us. Some observers have begun to conclude that the difference is deeper than finance or politics, that the difference is cultural. The Japanese are just different from us, we conclude, so we may find their ways interesting, but we will not find them instructive.

To support this cultural interpretation, however, we must believe that at least one, and perhaps two or all three, of the foregoing theories are correct. We must believe that (1) the Japanese engage in protectionism and the U.S. does not (this is a cultural difference) or we must believe that (2) the Japanese saver willingly accepts lower interest than he should and that the Japanese Development Bank is able to pick winners and deny loans to losers and that due to cultural differences, these things could not happen in the U.S.; or we must believe that (3) the Japanese have found a way to make central planning succeed, something which we believe to be impossible, but they can do it because of their cultural uniqueness.

In my new book, *The M-Form Society*, I offer in some depth my reasons for rejecting each of these explanations. In brief, I would argue as follows: (1) both the U.S. and Japan engage in some protectionism, although the Japanese have been more protectionist than has the U.S. in recent years; (2) both nations offer financial subsidies to certain domestic priorities: the U.S. heavily subsidizes agriculture and home ownership, while the Japanese subsidize industrial development; (3) neither nation engages in central planning, although the bureaucrats of both nations would love to have the chance. I conclude that none of the three theories is satisfactory in explaining what the Japanese Formula is, and I conclude that so far, we have no reason to believe that the difference, whatever it is, is culturally based.

Our system of free enterprise is incompatible with any form of central planning, and few of us have confidence that our bureaucrats would make effective planners.

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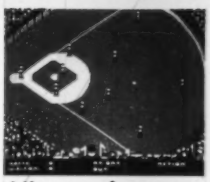

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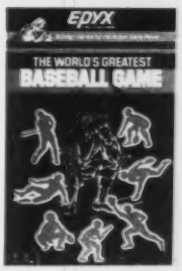

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The M-Form Explanation

What is the "formula" with which Japanese industry has successfully penetrated one high technology industry after another? The answer lies partly in the quality of Japanese education, partly in the popularity of engineering training among young people, partly in the high savings rate, partly in the success of joint research and development efforts. Each of these constitutes a social endowment, an asset from which many firms and individuals in the economy benefit. The Japanese produce these social endowments in large amounts. They do so despite the fact that each company is a profit-seeking independent competitor. They do so because they have an M-Form Society.

The M-Form refers to the multi-divisional company, known among organization scholars as the M-Form. The M-Form is distinguished from other types in that it alone is capable of attaining simultaneously a balance between teamwork and competition. The M-Form is most common among very large companies. The company is divided into several divisions, each of which competes against the others for capital and other resources. At the same time, however, the divisions must sometimes share laboratories, marketing staffs, and other common resources. The M-Form company can succeed only if it sustains both a high level of competition between divisions and a high level of teamwork among them. The research of the past several years very strongly suggests that, among large companies, the M-Form is the only type that is successful over the long run.

Note that an M-Form company is neither centralized nor anarchic. Each division is left to make its own decisions and to set its own directions, rather than having to wait for centralized decisions from above. On the other hand, the top management sees to it that the divisions will work as a team when necessary. The job of the top management is to see to it that no one division behaves in a manner so selfish that it refuses to contribute to those joint efforts, or social endowments, without which the company as a whole cannot succeed.

This teamwork is possible between competitors only if there is within the company a "social memory," that is, an ongoing body of corporate leaders who are well informed about which divisions have been selfish and which cooperative and who can see that both the selfish and the cooperative receive their just rewards in the end. With this kind of social memory, even competitors can work together as a team from time to time, although the teamwork may not be easy for them.

In Japan, the electronics and computer industries have moved ahead in part through joint R&D efforts which combine companies which are ordinarily deadly competitors into a temporary team. How they do this mystifies many Western observers. Most of us have concluded that this kind of teamwork can exist only if it is enforced by a powerful government agency, and thus the belief that the Japanese engage in central planning. But this explanation is not satisfying.

What is the "formula" with which Japanese industry has successfully penetrated one high technology industry after another?

In the first place, we know that central planning does not work. Is it that Japanese bureaucrats are so much smarter than ours that they can target winners one after another? Such an explanation strains our belief. In the second place, the facts show that the U.S. government has a far larger staff, collects more taxes, and spends more money per citizen than does the Japanese government. A disinterested observer would probably conclude that the U.S. does more central planning than does Japan.

Joint R&D in Japan

If we look more closely at the joint R&D projects in the Japanese microelectronics industry, what we see is competition plus teamwork. We do not see selfless companies who cooperate as they are told out of loyalty to country and to emperor. We do see competitors who acquiesce to an uncomfortable but necessary temporary collaboration. We do not see a kind of easy collaboration that is culturally foreign to us. We do see selfishness, tension, and infighting that are all too familiar to Westerners. We do not see a willingness to put up with all of these troubles because of a childlike faith in eventual repayment of favors. We do see a permanent and powerful network of private trade associations, government officials, and government endorsed but privately run discussion councils, all of which are linked together and constitute as a group an effective social memory—social memory so complete and so powerful as to guarantee that both the selfish and the cooperative will be remembered and repaid.

Consider, through some brief examples, what this kind of cooperation among competitors can mean for a rapidly developing high-technology industry:

The Super-Computer (1966-71)

This project joined Hitachi, Fujitsu, NEC, Toshiba, Oki, Mitsubishi, the government Electro-Technical Laboratory, and the University of Tokyo. The project consumed $44 million of public funds and, it is estimated, at least an equal sum of company funds. The object was to match the IBM System 360. The initiative came from the computer companies rather than from the government. The project was partially successful but caught up to the System 360 just as the System 370 was announced.

JIPDEC (Founded 1967)

The Japan Information Processing Development Center is funded by the government. JIPDEC carries out research on software, does contract work for government agencies, and offers many conferences and training programs. The goal is for JIPDEC to engage in information gathering on a scale that no company, and especially no software company, could achieve on its own. JIPDEC also serves as a legally safe common ground on which companies can engage in a sustained dialogue on the problems to which they must find common solutions.

ITPA (Founded 1970)

The Information Technology Promotion Agency is funded one-half by the Japanese government and one-half by the six major computer makers. The agency has two major objectives: to develop software applicable to the entire industry and to guarantee loans to be made by banks to small, start-up software firms. Ultimately, the goal is to funnel $720 million of bank and

government funds into these start-up software companies. ITPA has been a big success.

ECSTRA (Founded 1979)

The Electronic Computer Basic Software Technology Research Association is a five-year joint R&D project of NEC, Hitachi, Toshiba, Mitsubishi, and Fujitsu. The government will provide $103 million in deferred payment and low interest loans, and the companies will put in $103 million of their own money. The basic software technology developed by ECSTRA will be disseminated to the approximately 2000 small software houses through the ITPA, through the training programs of JIPDEC, through courses run by universities and sponsored by the Ministry of Education, and by the companies themselves.

The VSLI Research Association (1976-1979)

This four-year joint R&D project joined the five major computer makers with the government electro-technical laboratory. The goal was to achieve the technology for manufacturing the 1000K RAM and the 1000-gate logic device. The project consumed a total of $308 million. Of this, $132 million was low interest government loans, and the remainder was company funds. The companies in the project argued over everything from where the joint lab should be located to who would chair the various steering committees, but they stuck it out and succeeded. The companies not in the project simultaneously achieved some of the same advances on their own.

The Fifth Generation Computer Project (1981-1990)

This ten-year project joins the major computer makers with the government electro-technical laboratory in an effort to develop a fundamentally new architecture. For example, the Fifth Generation Computer has the goal of being able to understand multiple human speakers at three times the rate of normal speech, with a vocabulary of 50,000 words and an accuracy of 95 percent. The project calls for a total of $450 million in government funding and an estimated $900 million in company funds over a ten-year period, for a total of $1.35 billion.

What is striking about these projects is not their cost nor the size of government loans and subsidies. Indeed, the funds involved are small compared to similar projects in the U.S. The U.S. Congress appropriated $1.5 billion of outright research contracts (not loans) to U.S. industry for photo-voltaic solar energy research in the late 1970's, and many billions of dollars have been spent by our government on nuclear reactor research, particularly on the breeder reactor.

The difference is that these large scale U.S. efforts at joint R&D have been spectacular failures and, not incidentally, that they have been largely initiated by and shaped by politicians and bureaucrats. By comparison, the design of each of the Japanese cooperative efforts described above came up from industry and survived many rounds of trade association scrutiny, and only the small number of proposals which could attract widespread private support were taken to the government for consideration.

In the U.S., we do not have in place a mechanism that can serve as an information source and training center for software development.

In the U.S., we do not have in place a mechanism that can serve as an information source and training center for software development. There must be literally dozens of firms which each day re-invent and solve anew software problems which others, unknown to them, have solved before. We could create some such center which would be acceptable to the many segments of the industry and acceptable to the American public, but only with consensus among the industry members.

Without consensus, each segment of the industry will approach its congressman with a proposal that serves its needs but either ignores or actively damages other parts of the software industry. The congressman will be happy to introduce a bill to placate this constituent, but he knows full well that the bill has no chance of passage. In a typical two-year session, the U.S. Congress introduces 22,000 proposed bills, of which 2 ½ percent (excluding private bills, such as a bill to settle a claim for payment) will pass.

What is striking about the examples of joint activity in Japan is how sensible each project is, how small its cost to taxpayers, how well the results are disseminated throughout industry. All of these design characteristics will emerge, of course, if the project has been designed by the companies in the industry rather than by bureaucrats. Competitors can work as a team, for short periods of time and in limited ways, without damaging the fundamentally competitive nature of our economy.

It is already true that U.S. companies collaborate on a large scale in university-based research and training, but it is rare for them to do so except in that setting. We can build the units of social memory by reviving the trade associations and by using effectively the discussion councils of our nation. The U.S. government maintains approximately 1200 discussion commissions through which 23,000 private citizens give advice to the many arms of our government. These can be re-organized and used more effectively.

If we can rebuild our trade associations and government commissions into more effective units, they can become our social memory. If we know that this social memory is strong enough to prevent free riding and narrow selfishness within the industry, then all (or at least most) of the parties will be willing to work as a team from time to time and when the need is great. With a balance between teamwork and competition, we can improve the underlying strength both of our economy and of our nation as a whole.

An Optimist's Perspective

Our nine-year-old son, wondering out loud, asked at the dinner table last night, "If you were the last, last person in the whole world and there was no one else, what would you do?" Our 14-year-old daughter, perhaps as a result of having asked that question of herself years ago, answered without hesitation, "I would go out and find the other last person in the world and make friends."

It has too often been fashionable over the past decade to argue that the vast forces of history show us that nations pass inevitably through broad cycles. We should not blame ourselves for the fact

that U.S. industry lost 16 percent of its share of world market in the 1960's and lost another 23 percent during the 1970's; some decline is inevitable. Interest group politics are inevitable; political/economic gridlock is therefore inevitable, and the loss of our ability to cope with broad industrial problems is also inevitable. That, in many quarters, is the summary of the state of our nation.

The ruling ethos of the modern university finds such a conclusion to be nothing more than a proper object for skepticism. The scientist who inhabits the university or the laboratory is nothing if not a skeptic. Science proceeds only when doubt that anything generally accepted is actually true, only when we doubt that anything believed to be impossible actually is. Scientists, being skeptics, are therefore necessarily optimists. We need only to apply the attitude of skepticism to our study of our industrial problems to end up being optimistic that we will find ways to solve them. 完

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Coporate Careers With Japanese Companies in the U.S.

日系会社での米人管理職

A.F. Antom

In the early 1960's, Bob Dylan wrote "the times they are a' changin'."

Today, in the 1980's they continue to change. And as they change they bring with them new opportunities in business. One of these, brought to us by the now infamous oil embargo, is the opportunity to be employed by wholly owned subsidiaries of foreign multi-national corporations that seek to do business in the U.S. In particular, the United States has become a prime market for the manufactured goods of other nations, the most influential of which is, of course, Japan.

In attempting to facilitate trade in the United States, Japanese multi-nationals are expanding their U.S. based subsidiaries, thereby increasing employment opportunities for American professionals. Unfortunately, all is not as it seems to the American who takes a position with a Japanese multi-national.

The discussion that follows is based on situations and events which I have experienced in almost 20 years with U.S. and Japanese multi-national corporations. Every instance I describe has been verified by colleagues in positions similar to mine. Although I did not intend this to be a sociological study of Japanese and American corporate differences, the situations I cite are illustrative of interesting traits which might be significant to career-minded Americans.

A.F. Antom is quite real, and not the ghost that his name would suggest. However, as he is still employed by a foreign corporation, it semed prudent not to use his real name on this article for reasons that will be quite apparent as you read the article.

The Opportunities

In the fast moving electronics industry, whether his skills are in technology, marketing, or finance, the career-minded individual has a choice between the entrepreneurial start-up venture and the national or multi-national corporation. Benefits of these two environments are well documented. For many, the high payoff style of the start-up is exciting. Others prefer the security and stability of the corporation even at the expense of financial compensation.

Until recently, opportunities in the U.S. electronics industry existed for people seeking professional career in both of these environments. But now, the explosive microcomputer business, led by price cutting and consumer product-like merchandising, has attracted a new element into the United States, an element

Illustrations by Peter Kelley.

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Intelligent Microprocessor	✓	✓	✓	✓	✓
Tone and Pulse Dialing	✓	✓	✓	✓	✓
Hayes Command Compatible (Works with Smartcom™)	✓	✓		✓	
Additional telephone jack with exclusion switching	✓			✓	
Analog loop back self test	✓	✓	✓	✓	
Self Test at Power Up	✓		✓	✓	
Call Progress Detection (Busy, Dial Tones, Trunk Busy, etc.)	✓		✓	✓	
Speaker and External Volume Control	✓	✓	✓	✓	
Full Complement of Status Lights	✓	✓			
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On-board Personal/Business Directory	✓				
Buffer, Expandable to 64K	✓				
Auto Logon Macros	✓				
Auto message transmission to groups of numbers	✓				
Records call duration	✓				
12-character Alphanumeric Display	✓				

*Comparison made by Prometheus on the basis of the best information available to Prometheus at time of printing.

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that offers a third environment for career multi-nationals who are attempting to enter the U.S. microcomputer market and are establishing and staffing wholly owned American subsidiaries.

Decision Making and Career Potential

Much has been written about Japanese corporate business and management styles, and it is not my intention once again to delve into that material. However, there are several elements of Japanese corporate behavior which must be understood if we are to explain the experiences of Americans employed in Japanese companies operating in the United States.

Japan is a mass society whose every part is geared toward reinforcing the whole. Unlike the United States, there is little room in Japan for entrepreneurship. This characteristic is reflected in Japanese corporations where talented and creative individualism is not encouraged. Decisions are made by consensus management, and team effort toward realizing project or business goals is standard fare.

This method of decision making presents one of the greatest frustrations to the American corporate manager. In U.S. corporations, decisions are made by superiors who have been presented by their subordinates with both data and alternatives. Depending on the scope of the decision and its implications, decisions can be made by first level managers or those higher up, as required. This is not always a simple process, but even in the most stratified corporation, each manager has an opportunity to affect decisions at higher levels by making and presenting his case. This process is probably the major vehicle by which rising stars in a corporation can gain visibility and leave impressions on senior managers.

In Japanese-owned American subsidiaries, the process for decision making is entirely different. The decision making process is by consensus. And for the American manager this means consensus decisions made in Japan—not America. This usually results in enormous delays between initiation of the process and a final decision. It also means that there is a high likelihood that the decision makers, who are not part of the environment wherein the decision must be made, do not understand the circumstances completely, and will not arrive at an optimal decision.

Where speed and determination are essential, this usually means missed opportunities while the problem is being discussed and debated by Japanese managers residing across the Pacific Ocean.

And this process points out a second and perhaps more serious drawback for career-minded corporate American employees. Except as a collector of data and executor of policy, the American manager plays a very insignificant role in the decision making process. This phenomenon does not augur well for promotion-minded managers whose career opportunities within Japanese subsidiaries are minimal.

Working Conditions

Another interesting feature of the Japanese corporation is the office environment of the typical Japanese professional. Offices in Japan are large "bullpens" where new and experienced workers' desks are set side by side. Project and department managers' desks are also situated in the bullpens, but usually in more "strategic" locations. Even divisional managers' and presidents' offices tend to be small, often set in a corner of another bullpen, closed off from the masses by only glass or thin wooden walls.

This is so unlike the United States where, within corporate environments each professional's workspace characterizes his seniority and responsibilities. The new hire often works in a bullpen, and with each successive promotion moves to a shared office, single office, office with door, larger office, office with picture, etc.

These differences in attitude regarding offices can be explained by the differences in the geographic nature of the two countries. In America, land and space are bountiful. Not so in Japan where overcrowding is an accepted condition.

One of the interesting consequences of this situation can be seen in the behavior of Japanese executives who are assigned to the United States for a few years. Many Japanese managers upon arriving in the U.S. obtain the largest luxury U.S. built auto they can afford. This is their opportunity to wheel around on our uncongested streets and freeways which are so different from the narrow crowded roads of Japan. Evidence of the desire to break out of those tiny Japanese economy cars which we Americans

so cherish, can be seen in many California high tech Japanese corporate parking lots. The reserved executive parking spaces are filled with the American cars belonging to Japanese managers, and the rest of the lot is filled with American-owned Japanese cars.

Another phenomenon, which is a consequence of overcrowded office space in Japan, is the opposite situation which Japanese managers select for themselves when they are assigned to America. Many Japanese who work in the American subsidiary separate themselves from the day-to-day project or managerial activities of their U.S. employees. Instead they act as liaisons with Japan, as overseers of events, or as policy administrators for the home office. It is not al-

ways clear to the American staff the exact nature of the Japanese employee's assignment, or even of his status in either the subsidiary or the home office.

Nevertheless, it is inevitable that regardless of assignment, status, or responsibilities, every Japanese employee will have office space unlike any he has had in Japan. His assignment in America is his opportunity, as with the automobile, to enjoy, even for a short time, the expansiveness of America.

Though this may be understandable from a sociological standpoint, the effect on the morale of the American employees can be devastating. Consider, for example, the typical corporation employee who aspires to increased responsibility and status, who works hard to attain it, and time and time again loses his opportunity to acquire some of the trappings of promotion to Japanese executives whose contributions are not obvious to him.

In the Japanese-owned U.S. subsidiary for which I work, there are two kinds of managerial office space. One, twice as large as the other, is located on the exterior walls of the building with large windows. The other is smaller interior space. In virtually every case, the large windowed offices are occupied by the cadre of Japanese on assignment, while the interior offices are all occupied by American management.

As a sort of corollary to this situation, Japanese employees tend to occupy their offices late into the night, well past the late hours worked even by compulsive American workaholics. These late hours are usually spent communicating with the home office in Japan where the morning start-time coincides with American nightfall.

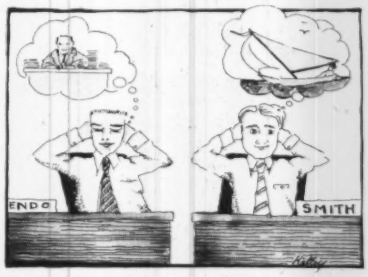
In the firm described above, because the large Japanese offices are set off from the smaller American-occupied offices, the separating aisle is often described by the American staff as the "international dateline."

Career Paths

Both in the United States and in Japan, corporate career paths are very well defined. Talented individuals can move upward from level to level until either the Peter Principle takes effect or the employee "screws up" and lands in the "penalty box."

Promotions in Japan are a function of talent and seniority. Unlike the U.S., where corporate success leads to quicker and quicker promotions, in Japan, there appear to be defined terms associated with each career level. Regardless of the level of accomplishment, Japanese corporate employees must serve their term before proceeding up the corporate ladder.

The concept of the penalty box is also different in a Japanese corporation. In the United States, the penalty box has been described as a one- or two-year period of penance which higher level managers serve when they have committed a corporate blunder. The employee's career usually comes to a dead stop for a period of time. All his perq's—salary, office, secretary—remain in effect. However, his phone usually stops ringing, and company activities pass him by.



In Japan, most corporate managers would be embarrassed to use any part of their vacation.

In Japan, corporate blunders are penalized more severely. Instead of a lull in his career, the Japanese blunderer's career usually comes to dead stop and a dead end! And though his day-to-day work does not stop, opportunities for advancement within the corporation are usually ended. Unlike the U.S., where if this were to occur, the employee might seek employment elsewhere, in Japan where every person is trained to maintain the orderly patterns of society, the Japanese employee usually acquiesces.

Vacations

In the United States, material reward for a job well-done in a corporation takes two forms—salary and vacations. The higher up you rise, the more responsibility you acquire and the larger is your compensation. Additionally, the longer you spend with a corporation, the longer your annual vacation period. And most Americans look forward to those holidays each year.

In Japan too, the corporate laborer is rewarded both financially and with vacation days for time on the job. However, in Japan, most corporate managers would be embarrassed to use any part of their vacation. Work and production goals induced by corporate peer pressure prevent career-minded Japanese from taking time off.

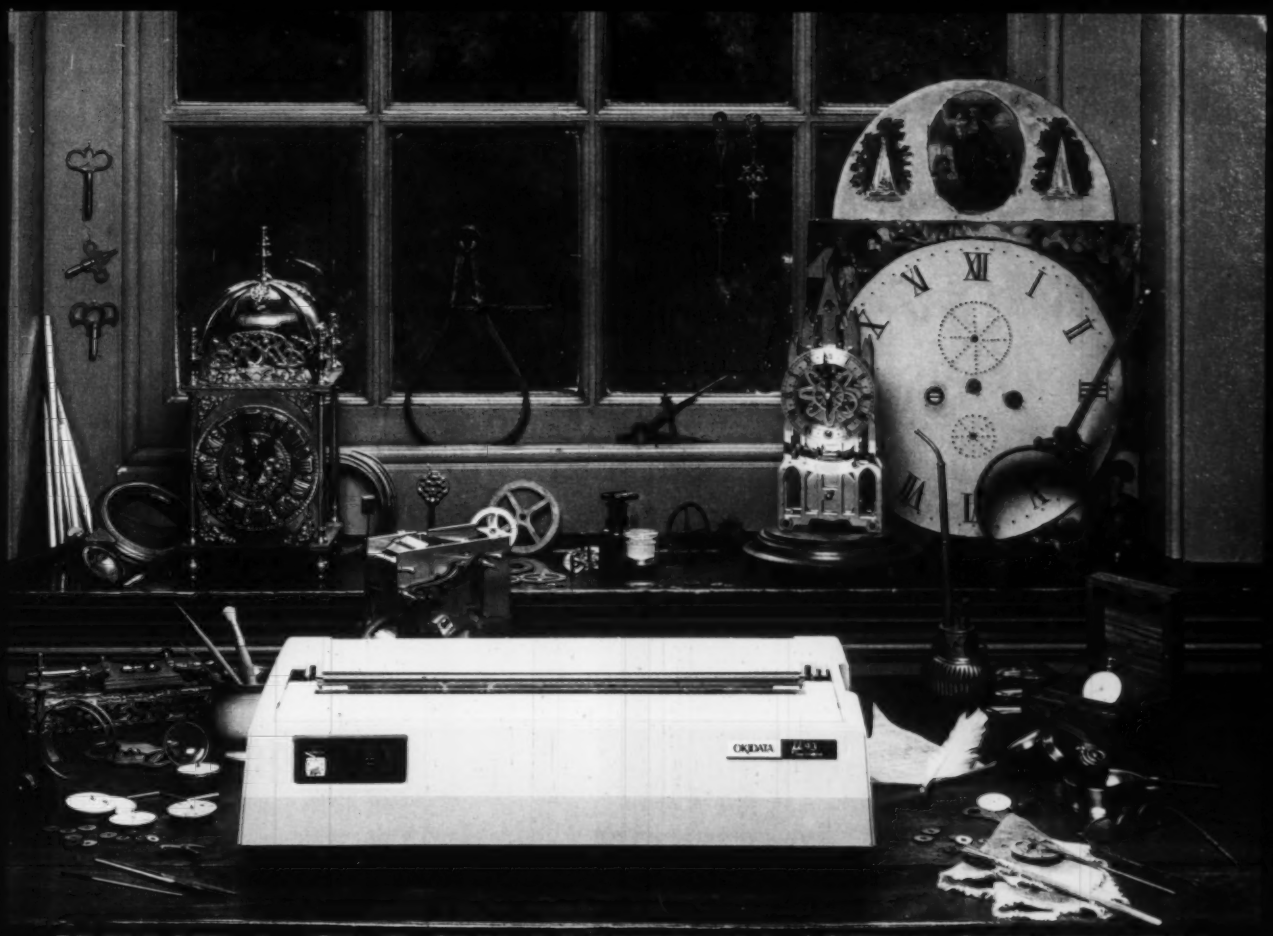
One of the most disturbing situations encountered by American executives in Japanese-owned U.S. subsidiaries is the reaction of Japanese managers to American vacations. The Japanese manager even in America brings with him his attitude toward vacations, and it is apparent that peer pressure with regard to vacation continues to be exerted even while he is in the U.S. Within managerial circles which include both Japanese and Americans, the Japanese raise their eyebrows upon learning that an American manager is taking any of his earned vacation.

Again, this sort of behavior seems petty and incidental to larger and more important issues. But it serves to illustrate how a clash between cultures can have upsetting and uncomfortable effects on employee morale. And after all, when an American chooses a corporate rather than an entrepreneurial career, one of the things he seeks, is an assured comfort level in his working environment. But in a Japanese-owned U.S. subsidiary, there is no guarantee that the expected comfort items will be available.

Women as Managers

The place of women in Japan has been described in many texts and articles. In a nutshell, there is virtually no place for women professionals in a Japanese corporation. While it is certainly true that American corporations have not granted across-the-board professional parity to women employees, there has been a definite trend in this direction. Despite the pleas of apologists for Japan, one can barely perceive an equivalent trend in Japan. Except in secretarial and clerical positions, women employees are visible only when they pour tea and coffee for their male bosses and their guests.

This attitude prevails also in the American subsidiary where there is an inherent anti-female bias among the Japanese. As in Japan, it is common to find women occupying clerical and sec-



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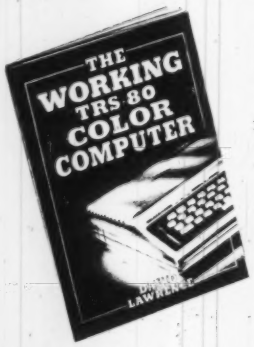

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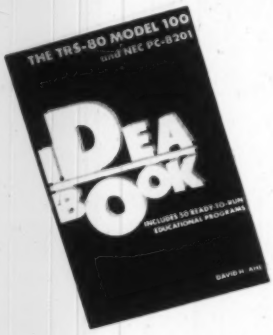

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retarial positions. A concession that seems to be made in the United States is the hiring of women for professional and technical positions. To find a woman in managerial ranks is rare. In fact, I suspect that in the United States absolute legal minimums are adhered to only when there is no option.

Women managers, when they are hired, seem suspect, and their judgment is questioned more often than is that of their male counterparts. Nor, unfortunately, can woman managers expect the same promotions as men.

Doing Business in a Foreign Land

Japanese multi-national corporations and their U.S. counterparts have many similar business philosophies. Their main objectives are to generate revenue and be profitable. And despite claims to the contrary, they prefer to generate revenues in several countries, while maximizing profits in the home country. It follows then, that these companies prefer to minimize the cost of business in every country in which they do business and treat all foreign subsidiaries as branch offices whose sole purpose it is to sell and service the company's products.

When a multi-national opens a manufacturing plant or a development center in a foreign country, unless the goal is to capitalize on cheap labor, the corporation is usually satisfying government demands for the company to provide employment and economic opportunities within the country in return for a license to sell its products in that country. This has been standard practice for U.S. as well as other multi-nationals and has resulted in a number of Third World countries receiving what would be, based on their standards of living, very high tech R&D centers.

A consequence of these unofficial trade agreements between governments and corporations is the plethora of offices established by the foreign company in the communities in which it wishes to do business. This proliferation of offices provides a solid corporate image in the community.

This situation is probably a major source of much of the difficulty an American encounters when employed by a Japanese company. For it is this very image, so similar to the one established by local American multi-nationals that misleads the local national into believing that all corporate environments, be they American or Japanese, present similar working conditions and attitudes.

An example of such attitudes is company loyalty. Executives working for U.S. multi-national corporations typically feel a sense of loyalty to the company family. It is common for these companies to reward loyal employees with a variety of bonuses based, not only on exemplary performance, but also on length of employment. The ten-year pin and twenty-year dinner probably do more to generate continued high performance than do the annual performance appraisal and salary review.

Company loyalty is also fostered through other programs, not the least of which is, for non-unionized firms, job security. Consider, for example, the loyalty inspired within IBM when, even

In a mature business, a complaint should be judged on merit rather than race.

in times of severe recession, not one employee is laid off.

Of course, such corporate policy is not effected without significant short term cost to the company. A perception of the value of such policies is an indication of the maturity of the management (and ultimate success) of the company. A relatively immature company, or one unable to hold on through bad times, seeks to eliminate employees who are unable to contribute directly to the bottom line. In a sales-oriented company, branch office staff are laid off. In a manufacturing company, production workers receive pink slips.

Mature multi-nationals plan for bad times, even during good times. For example, IBM, justifiably reputed to be a marketing company, is also a manufacturing company. However, IBM's manufacturing processes include a large amount of work sub-contracted to outside firms. When there is a decrease in demand for IBM products, it is the subcontracted work that is reduced, not the IBM work force.

A significant indication of IBM's maturity level is the consistency of this practice, even outside the United States, in Third World countries where IBM has both sales and manufacturing facilities. These policies foster not only corporate loyalty to the parent corporation, but also an international loyalty shared by IBMers around the world.

But what of Japan? Are there parallels that an American corporate employee can expect to find when he chooses a Japanese multi-national as an employer? Unfortunately there are not! Japan has historically been an insulated and isolated country of islands. Until World War II, when external influences were forced on the country, Japan had been closed. And it would be naive to assume that the last 40 years has significantly changed Japanese attitudes in this regard.

Japanese are fiercely loyal to their homeland, as are Americans. But unlike extroverted America, Japan has yet to understand the need to enlist foreign assistance in accomplishing its business goals. It is rare to find a Japanese multinational corporation that treats its offshore subsidiaries as more than expendable branch offices. The often-discussed concept of lifetime employment, so prevalent in Japanese companies, is virtually non-existent for non-Japanese employees.

The relative immaturity of Japan's multi-national corporations is illustrated by the following incident. A manager responsible for attending to customer complaints regarding the company's products marketed in the U.S. had established a very organized, workable, and objective response system for such complaints. Letters and phone calls concerning product deficiencies were handled in an orderly cost-effective manner. From time to time, such complaints were received in written form, addressed to the Japanese president of the U.S. subsidiary. Usually, these letters were automatically forwarded directly to the manager of the complaint department.

However, on occasion, written complaints, signed with Japanese names were received. Inevitably, the personal presidential attention received by such letters was disproportionate and unrealistic—attention far in excess of that paid to similar correspondence from non-Japanese customers.

In a mature business environment, a problem of complaint should be judged on merit rather than race. Unfortunately, Japanese corporations, in their chauvinistic immaturity, often base business decisions in their off-shore subsidiaries on criteria of home-grown nationalism. This phenomenon can be most distressing to Americans who are unaccustomed to being patronized by other nationalities, or who for more objective reasons, are accustomed to working in environments where business is business—regardless of nationality.

As for being an employee of a Japanese multi-national in an off-shore environment, the following anecdote will shed considerable light on Japanese managements' attitudes toward Americans working for the Japanese-American corporation.

An American executive working for a Japanese subsidiary was approached by an American firm seeking to lure him away for marginal improvements in his compensation package. The executive, accustomed to multi-national business environments, was uncertain about the prospects of the American firm, but was more uncertain about the Japanese parent's commitment to the U.S. subsidiary. In an effort to determine the parent's long range commitment to the U.S. business, the executive sought the advice of one of the Japanese assigned to the subsidiary.

Following a hearty meal including a number of aperitifs, cocktails, and liqueurs, the American explained his dilemma directly to his Japanese colleague. The Japanese, who was no less affected by the alcoholic nature of the dinner, responded candidly. The American was told that the parent firm's commitment to the U.S. market was assured; however, the company expected American employees to seek other employment regardless of the company's success or lack thereof. Japanese management had no expectation of loyalty from their American employees and would terminate American employees if market expectations were not met.

Consequently, the executive was told, Japanese management considered every American expendable, including him. And if he wished to leave the company, regardless of his value and previous contributions, no one would care.

For American executives who choose a corporate business environment with attendant lower remuneration, this Japanese attitude can and should be unsettling. Frequently, the American manager has prepared himself for a lower income in exchange for job security. He has intentionally decided to dedicate himself to job excellence within the corporate environment. While such a strategy usually pays off in job security for Americans (and even for foreign nationals) working for American multi-nationals, it is not necessarily so for non-Japanese employees of Japanese multi-nationals.

Third World Versus First World Countries

In all fairness to the Japanese, it is important to recognize that Japanese multi-national corporate behavior is a reflection of Japan's relatively recent entry into international business. Japan, like a few other world nations has high self-esteem, which often manifests itself as arrogance. This behavior can be seen in instances of patronizing treatment such nations give to lesser or newer nations. (Remember the ugly American?) Examples include France in Algeria, Britain in India, and Portugal in Angola. While it is no less true that Algerians resent the French and Indians the British, of concern in this discussion is America's reaction to the Japanese.

When a Japanese corporation establishes an American subsidiary in the United States and employs within it American citizens, a force comes to play that is very difficult to contend with. The force is a consequence of the strong personalities of the nationalities involved. Japanese corporate management views the American subsidiary as equivalent to (but perhaps more lucrative than), for example, a subsidiary in any foreign country. And the employees of that subsidiary, rightly or wrongly, are as expendable to the Japanese as any other foreign national employed in any other subsidiary.

Americans, however, have always viewed themselves as a major political and business force in international affairs. In the minds of many Americans, most of the "important" multi-nationals have been founded by Americans; and the subsidiaries of those companies have been well, though often condescendingly, treated. Many corporate-minded Americans have been trained in such companies, and when they leave, take with them this attitude of American corporate superiority. This, like the managerial, organizational, and technical skills learned in the U.S. corporation, stands the executive in good stead if he moves to another U.S. corporation. It even stands him in good stead if he moves to a subsidiary of a French or British multi-national. There is enough commonality among such nations to permit the executive to adapt to being part of an off-shore facility.

However, the differences between the Japanese and Western cultures are so vast, that similar adaptation is enormously difficult. It is a whole new ball game. And the rules are made in Japan. Even the umpires who determine what is fair are Japanese. No longer can the U.S. corporate manager expect preferential treatment in job assignments; no longer is he a part of corporate decision making; no longer does he have quick and easy access to upper management. Now the American, who is merely a replaceable employee of a Japanese firm, finds himself within a group of expendable employees located in the Japanese company's remote branch office of the United States of America. And this can be a bitter pill to swallow.

Be Aware!

At the beginning of this article, I cited the two career environments that have traditionally been open to American professionals. One, the high risk entrepreneurial venture, and the second, the secure, but often less financially rewarding corporation.

In recent years, with increased wealth and skills being acquired and developed in other countries of the world, the U.S. marketplace has become a target of some of these countries. Consequently, we find more and more foreign influences in our own business backyard. It is essential for us to understand those influences and not be naive in any part of our dealings with them. This includes trading with these nations, employing their nationals, or, as is becoming common, being employed by them. There is nothing insidious or traitorous in being employed by a Japanese or any other multinational corporation. We should, however, be very aware that the work environment is very unlike any we have experienced before. 完

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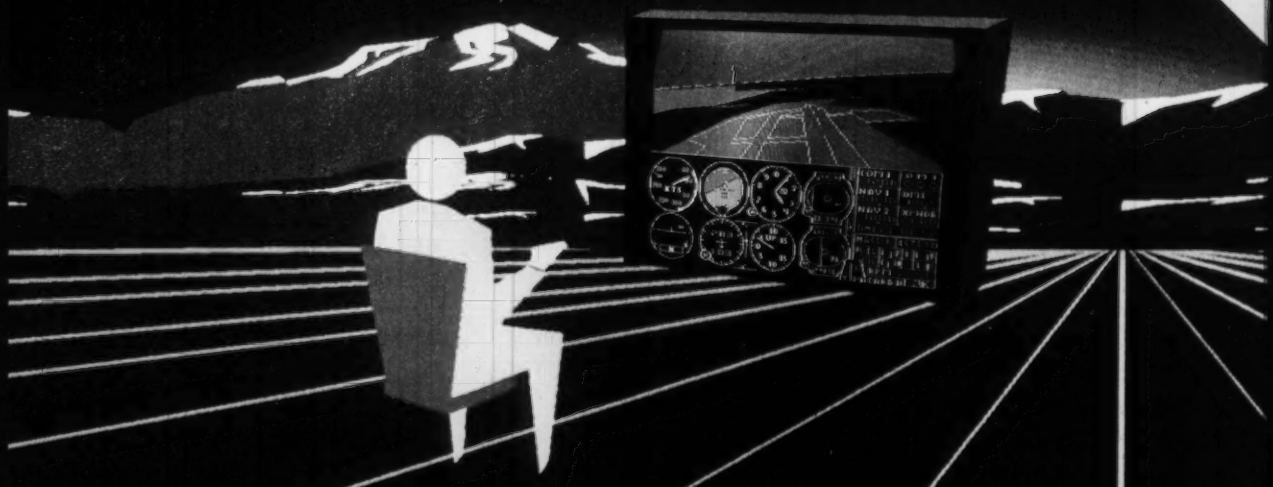

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Japanese Management Methods

Explaining the Success Story

日本式経営方法

Paul Grosjean

In less than 40 years Japan has risen from the ashes—literally—of defeat to world preeminence in many areas of technology and business. This astonishing success has challenged observers to find an explanation.

One popular explanation gives the credit to the Japanese method of management. Attempts have been made to identify the elements of this method in the hope that American companies could apply the elements and reap similar benefits.

To take these elements as insights into the situation and to use them as goals would probably be beneficial. However, to take them as a methodology without realizing the enormous cultural base on which they rest and which makes them successful in their setting is to risk failure. The general culture prepares people to participate in its processes through ways they often are not even aware of. As a result, the efforts to apply Japanese managing insights have met with limited success on the American scene.

For example, we Americans have a fixation about voting as a decision making process. We assume that, if people engaged in settling political issues by bullets will just stop using bullets and use ballots (with apologies to Abraham Lincoln), everything will be all right. If they have voted, their problems are solved, and we can turn our attention to other matters.

But we often forget the cultural base that prepares us to trust this process.

Illustrations by Peter Kelley.

Management decisions are largely made by consensus in Japan.

Through a myriad of ways woven into our culture, we are taught to vote and abide by the results. For example, we let first graders vote, not to make decisions, but to train them to accept the will of the majority. We all participate in groups which make decisions by voting. This voting is real, but it is still practice for Election Day.

If I am on the losing side in a vote, I bow to the majority on the promise written into our culture that, when I am in the majority, the minority will bow to my wishes. Voting requires an enormous trust in that promise. If I cannot trust the winners of a vote when I am on the losing side, putting down my gun may be a form of suicide. If I cannot trust the losers when I am on the winning side, I must always be ready to reach for the gun. We cannot transplant this method of decision making to another culture with a different heritage and expect it to work as it does for us.

Let's look more carefully at the bases of four elements of the Japanese business

system that stand out so vividly: a consensus method of decision making, extreme employee loyalty, lifetime employment, and a kind of social life for employees centering in the work group.

Consensus Decisions

Consensus thinking rests on long preparation in Japanese culture. It begins with a child's socialization, and it is as fundamental to his socialization as majority rule is in our society. The Japanese child is taught from the beginning to behave in a certain way in order not to bring shame or disgrace on himself, his family, his company, or any group with which he is identified. This has been called an "ethic of shame." The child is warned, "Don't do that because people will laugh at you." He is taught to pay attention to the opinions of other people.

The first result of this training is that in order to avoid being shamed the child must become extremely sensitive to the opinions of others. He must become adept in determining the kind of behavior that the consensus of those around him approves. When he steps out of line, he is told. The responsibility here belongs not just to his parents but to everyone.

The second result is that the child becomes aware that he is part of a group and that he must conform regardless of his preferences. He learns that conformance is rewarded by the group; nonconformance is punished primarily by arousing the feelings of shame and disgrace which then require an act of apology. In Samurai times the ultimate act of apology was *seppuku*—ritual suicide. Some years ago the president of one company involved in a pollution case committed suicide to apologize for the damage his company had done—an act that Americans find incredible.

Although the term consensus is applied to the Japanese style, we must not assume that it refers to the same process we use. Consensus does involve pooling and developing ideas, but the most important aspect is finding out what others are thinking and conforming to it. One Japanese value is *wa*, harmony. The individual must not upset the harmony of the situation. We use committees for decision making, but even here we must ask what the purpose of the committee is. Is it to arrive at a decision by the free interchange of ideas, building on each other's insights, and achieving a level of thought that no one individual could have achieved himself? Or is it to discover and confirm publicly a decision already made by someone—the boss, the committee chairman, or a vocal committee member?

Obedience is based upon benefit already conferred and the trust that further obedience will be rewarded with benefit.

Employee Loyalty

Americans marvel at the loyalty of Japanese workers to their companies and contrast that loyalty to the confrontation stance often found here. In Japan, loyalty is based on the employee's trust that his loyalty will ultimately be rewarded. But where does this confidence come from? It is a concept woven into the culture as a part of its Samurai heritage.

The Samurai lord conferred benefit and favor on his Samurai warriors; in return they owed him unquestioned and absolute obedience even to the point of dying in battle or *seppuku*. Obedience is based upon benefit already conferred and the trust that further obedience will be rewarded with benefit. It is not that the Japanese employee has developed a trust that his particular company will reward his obedience. He has learned through the whole culture that this is the nature of things, so he can trust it.

In contrast, we are trained to believe that we shall be rewarded for our personal merit by being hired and promoted. In a course I recently taught on "Ethics and Business," which was attended overwhelmingly by students planning business careers, I regularly took a little survey in which the students were asked to make a promotion decision. Each candidate represented a value: loyalty, best qualified, affirmative action. Consistently, students chose best qualified by a substantial majority; loyalty was second; the affirmative action candidate received few if any votes.

Loyalty involves obedience. Obedience to the higher is woven into Japanese society through the Confucian ethic which structures relationships hierarchically: lord-

Suggestions and Short Vacations

When was the last time you made a suggestion to your employer? Does your employer even have a suggestion box or a system for processing suggestions?

In Japan, an average employee makes more than one suggestion every week. Last year, the 80,000 workers at Matsushita made nearly 4.8 million suggestions, or 59.8 per worker.

When was the last time you didn't take your allotted vacation or sick days? At one large U.S. company, managers encourage their employees to take off instead of accumulating unused sick days; "everybody does it," is the reason given.

In Japan, most workers take about half of their allotted vacation days, and sick days are taken only for genuine illness.

But all of this is part of the Japanese system of lifetime employment where changing jobs is viewed as desertion by peers and insanity by parents and friends. Lifetime employment means far more than just a job for life. Companies provide housing subsidies and many other benefits.

A Japanese manager is expected to have a strong relationship with his subordinates. It is not unusual for a manager to pay visits to his subordinates at home or to offer advice about family problems, dating, and personal matters. As Yoichi Shiroyama, supervisor of 70 TV assembly line workers at Matsushita told a *New York Times* reporter, "My subordinates are like members of my family, like brothers and sisters, sons and daughters."

"Sometimes," he added, "they have to be scolded like children. I have to be firm but compassionate."

A few years ago, Mr. Shiroyama spent some time at a Matsushita facility outside of Chicago helping to train American workers. He felt the biggest difference between American and Japanese workers was their attitude toward work. He felt too, that with people of many races and types, "it is difficult to create a feeling of oneness and teamwork among the workers in America."

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CIRCLE 181 ON READER SERVICE CARD

servant, parent-child, husband-wife, older brother-younger brother. The apparent consensus process cannot escape this structure. The employee gives obedience not only to the company hierarchy, but also to the company consensus. The company takes the place of the feudal lord.

In contrast, obedience is not a quality for which Americans are noted. During the Revolutionary War, European military officers training American troops complained that they would not instantly obey orders, but would always ask why. Then, having understood, the soldiers carried out the orders. We have tried to raise our children democratically, but on one occasion my Japanese wife slipped and told the younger boy that he should let his brother have something. He asked, "Why?" My wife replied, "Because he is older." He replied, "So what?"

Lifetime Employment

The ideal lifetime job security has a strong attraction for many (don't forget that only the larger companies can offer this and that the retirement age in Japan is 55), and this also has an effect on the working relationship. Loyalty is rewarded. It is worth giving your best because in the long run you will profit. It is possible to develop friendships. Personal professional goals can be fulfilled in the company.

Consider a contrasting scene. Some years ago a friend of ours got tired of spending three hours a day commuting to New York. So he found a similar job which permitted him to live ten minutes from his office. This astonished my wife. She did not understand why anyone would hire a man who had already proved his disloyalty by asking about another job nor why anyone would give him a better job than the one he had instead of making him start at the bottom.

If we ask a Japanese about himself, he will introduce himself by his company name and then his family name.

This involves a difference in life expectations. Japanese society is concerned with relationships; we are concerned with action. The Japanese works for a company; we work at a profession or skill. Here we ask a child, "What do you want to do when you grow up?" In Japan the question would be, "What company do you want to work for?"

Friendships generally revolve around fellow workers.

The way we identify ourselves provides an interesting clue. If we ask a Japanese about himself, he will introduce himself by his company name and then his family name. We may never learn his first name. Trying to find out exactly what he does is difficult. If we ask an American, he will reply with his name, emphasizing in most cases the first name (in our office even the interoffice phone directory is arranged by first names), his profession or skill, and we may not find out where he works unless we press the point.

The Japanese advances himself in one company through a series of jobs or skills. The American advances himself in his profession or skill through a series of companies.

On the Job Friends

The Japanese employee's circle of friends on and off the job centers on the people he works with to an extent greater than we generally expect. Certainly this undergirds the consensus, the rewards process, and loyalty. It is easier to be loyal to the company when many of the people who comprise it are your friends both on and off the job.

We must ask why this occurs. Part of the answer lies in the Japanese family. The Japanese Constitution requires that marriage be by the free consent of both parties. Nevertheless the vast majority of marriages are still arranged, though arrangement now serves as a method of bringing together two people who then freely decide whether to marry. During the time that the managerial group which led Japan is its present success got married, arranged marriages were ever more common than they are today.

In the arranged marriage, romantic love is not one of the prerequisites. Marriage is not for the purpose of personal fulfillment in an intimate relationship with the spouse. As a result neither husband or wife looks for or expects to find the kind of relationship we regard was fundamental to a successful marriage. If personal relationship (which has been called intimacy by some) is not found in the marriage, then it must be found elsewhere. It is easy to find it on the job with other men who have the same kind of marriages and have the same need for friendship. Traditionally, the wife does not share her husband's social life, especially in the company, nor does he share hers. His friends are not hers and hers are not his. This on-the-job friendship reflects the relational pattern of the old extended family system, not a unique Japanese variation of the nuclear family.

Even though the proportion of love marriages in Japan is increasing, love marriage is primarily an alternative to arranged marriage as a way of getting together.

After the ceremony, neither spouse has a role model for married love; they have only the model of their parents' marriage which was arranged. Even in a love marriage the behavior pattern of the spouses may not be all that different from those that were arranged. On the surface, Japan apparently has the modern nuclear family, but the values and practices of the prewar extended family system still have a powerful hold.

Japan is moving toward the nuclear family pattern because of the requirements of modern life, but the worker will have some hard choices to make. If he goes right home from work, he will make his coworkers and boss unhappy. This will undermine the consensus process. If he does not go right home, he will make his wife unhappy. This will undermine his marriage. The problem is even more complicated when women marry and try to continue working.

Conclusion

If the extracted ideas are to be applied, a careful consideration of the personnel who are going to be involved must be done first, and then the appropriate background cultivation must be done. An in-depth knowledge of the personnel as well as of group dynamics is required. People must be trained in group processes if they do not already have such skills. American workers have to be assured somewhere in this process that the reasons that led to the confrontation environment are no longer valid. 完

Dulling of the Sword

David H. Ahl

Grade B Movie Plot: Aliens land on Earth with plans to take over. All of our conventional weapons fail to stop them. Finally, our germs—or pollen, or water, or something which is commonplace to us—defeats them. Today, a parallel situation may be taking place with respect to Japan and the U.S.

Until quite recently—15 to 20 years ago—nearly all Japanese marriages were arranged. With such a system, neither the man nor woman looked to the marriage for much personal fulfillment. The social life of a man was with his business associates, and it was rare for a wife to meet her husband's friends or vice versa.

Creeping Meatballism

However, largely as a result of American movies and television, the concept of romantic love has blossomed in Japan. Thus, today, more than one-quarter of Japanese marriages are "love marriages" rather than arranged ones. As a result, marriage partners are beginning to look to each other for fulfillment. Moreover, beyond the man/woman relationship, the wider effect is an erosion of values and changing of expectations.

The widely held perception is that Japanese workers love their jobs so much that they willingly work long hours, skip vacations, and sacrifice their personal lives to their employers and their country. Not any more, says a recent report issued by the Aspen Institute for Humanistic Studies. The study examined how well jobs and worker values were matched.

The Japanese work ethic will not collapse, although it may sag enough to slow the country down.

Of the six countries included in the study—Britain, Israel, Japan, Sweden, the U.S., and West Germany—Japan ranked lowest. Only 32 percent of the Japanese questioned felt their jobs and values were well-matched; Britain was second lowest with 36 percent. In contrast, 49 percent of American workers and 55 percent of Israeli workers felt their values and jobs were well matched. As for Japan, the report concludes, "The changing value standards of the younger Japanese jobholders may well cause significant changes in tomorrow's Japanese—and world—economy."

Many Japanese researchers and managers agree. Tamotsu Sengoku, director of the Japan Youth Research Institute, observes that younger Japanese workers are more like Americans than the older generations. They work very hard on the job, but when the workday is over, they move quickly to their own pursuits, to family and friends. Traditionally, before and after the formal workday, Japanese workers spent time with their peers and supervisors in quality control circles or having a drink discussing how to improve their company's products. Says Atsuko Toyama, author of *A Theory on the Modern Freshman* (the name for a new college graduate), "The younger workers do what they are told and not one iota more."

According to a study by the Japan Recruitment Center, more recent college graduates describe themselves as oriented to the home (72 percent in 1983 compared to 66 percent in 1976). On the other hand, the divorce rate has also increased sharply in the past five years. Still far less than the U.S., about two percent of all Japanese households consist of a mother raising children under 20 years old. Furthermore, the number of women raising children born out of wedlock has increased by 250 percent over the past ten years.

Unlike the U.S., divorced women in Japan generally do not receive alimony or child support from the father. Instead, it is common for men to pay their wives a lump sum upon separation. While this trend has not had a noticeable impact on the economy to date, it is likely that in the future an increasing number of women will have to work during the years they are traditionally expected to spend at home with their children. This is likely to further erode the traditional work ethic and values of the youngsters in these households.

In an article about the Japanese work ethic in *Fortune* (May 14, 1984), Lee Smith opines, "In a sense, the rejection of work as a total way of life is not only understandable but healthy. Economic prosperity isn't supposed to be an end in itself. It's supposed to deliver people from exhausting drudgery so they can find pleasure in life beyond day-to-day survival."

Smith concludes, "The Japanese work ethic will almost certainly not collapse, although it may sag enough to slow the country down." 完

U.S. Managers Are Technologically Illiterate

米人管理者は技術的に無学

Yoshi Tsurumi

Whenever I start teaching a new class of business school students, I give them a little math test to get some idea about their technical skills. Typically I ask them to find the value of x and y in a couple of quadratic equations or to draw a graph of the function of one of these equations on the xy plane.

These are not usually difficult problems as math goes. More than 90 percent of 10th grade Japanese students can do the first one, and about 85 percent can handle the second. One would expect future American business leaders could perform these calculations with ease, since quadratic equations have to do with the fundamentals of minimizing and maximizing values—which, after all, is what business is all about.

Yoshi Tsurumi is Professor of Marketing and International Business at Baruch College, City University of New York. He has written eight books including *The Japanese Are Coming* and *Shogoshosha*. He is president of the Pacific Basin Center Foundation and has taught at numerous Japanese and U.S. universities including Columbia and the Harvard Business School.

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But my American students (at universities such as Harvard, Columbia, and UCLA) do not handle these problems with ease. Only about one-third usually can find the values of x and y, and very few can graph these values. Not only that, they complain bitterly about having to do these problems. They tell me they don't see the relevance of them to business.

This points up what I believe is one of the most serious problems facing American business: the technical illiteracy of its managers and executives. Few of them have the skills to solve real-world problems. Business decisions require weighing variables (x and y) such as sales and costs, product quality and productivity, price and market share, profits and taxes. But business managers aren't well equipped to reason and think in those terms.

The people running U.S. companies lack familiarity with the organizations they are guiding.

I have compared the top three executives of 24 leading Japanese manufacturers with the top three executives of 20 leading American competitors in such fields as semiconductors, computers, consumer electronics, steel, autos, chemicals, pharmaceuticals, industrial equipment, and processed food. The differences were dramatic. Two-thirds of the Japanese executives had science or engineering degrees, compared with only one-third of the American ones. Furthermore, none of the Japanese executives without technical training rose through their legal or financial ranks. But more than two-thirds of the American executives reached the top through careers as corporate lawyers, accountants, and financial officers.

Also, the Japanese executives with nontechnical backgrounds were heavily schooled in domestic and international sales operations, while the American executives with nontechnical backgrounds have mostly risen through advertising careers and corporate planning. This is typical of the career track of the new breed of American manager with an MBA degree. The whole preparation of American executives tends to make them aloof from the factory floor and from the human beings who are involved in the day-to-day task of making products.

This process begins early. People who make it to the top of Japanese industry usually have spent several years sweeping their own classrooms and cleaning their school toilets. In elite U.S. schools, of course, there are "custodial personnel" to do that dirty work.

If many young Americans entering leading graduate schools are already technically illiterate, three or four semesters of business school are likely to increase their disdain for getting their hands dirty in classrooms and factories. Once they join a company, opportunities for experience at the ground-floor level are limited. The result is that the people running U.S. companies lack familiarity with the organizations they are guiding.

Is it any wonder that they are drawn to legal or financial solutions rather than technical or human ones?

The Japanese chief executives I surveyed spent, on the average, 21 years in the same company before they were promoted to the lowest rank of corporate officer, and an additional 11 years in the same firm before they reached the rank of chief executive officer. With a few exceptions, they joined their firm right after graduation. Their American counterparts typically had gone through three or four job changes and had spent an average of only nine years before becoming corporate officers. Subsequently it took them only four or five years to become chief executive. In the United States 15 percent had been brought in from outside to become chief executive.

Too many American MBAs are taught to treat ordinary employees as disposable "direct labor cost."

This isn't the pattern in all American firms. Among my corporate samples were IBM, Procter & Gamble, DuPont, and Texas Instruments. Their chief executives' career profiles are similar to those of their Japanese counterparts. These American firms appear to demand that chief executives be thoroughly familiar with their people, products, and markets. It is no accident, then, that these firms have conceded nothing to the Japanese.

A typical Japanese business graduate who joins a company will spend six months to a year at a factory, followed by a series of assignments that help him to get to know factory workers, engineers, and managers. He is introduced to a corporate culture that encourages its employees to try out new things, learn from mistakes, and share information. He might even be sent out to work in a store where his company's products are sold, to see how the products are accepted by customers.

Compare that with the experience of many American MBAs who are told to show "results" within nine months or a year. They are not supposed to make mistakes. They hide precious information from other people. They are forbidden to make contacts with the people in other departments without going through proper channels. These whiz kids rush to reorganize the workplace, shave the cost of maintaining machinery or developing new products, concoct creative accounting schemes, and fire "low achievers." Chances are they won't be around when their splashy gestures prove to be disastrous. They will have moved on to assume more lucrative, higher ranked jobs elsewhere.

Too many American MBAs are taught to treat ordinary employees as disposable "direct labor cost." They are taught to swallow uncritically the myth that corporations exist only to reward abstract stockholders, that capital budgeting and financial controls are the most effective management tools. One result of the U.S. system is executives such as David Roderick, chairman of U.S. Steel. Roderick, an accountant by training, spent much of the $1 billion that the U.S. Congress made available through various tax cuts to purchase Marathon Oil—instead of modernizing steel facilities and keeping steel workers employed.

It is ironic that the Japanese system is modeled after an American system that no longer exists.

The irony of all this is that the Japanese system is modeled after an American system that no longer exists. After the war, Japanese industry put a premium on practical knowledge and hands-on experience. We looked to American teachers who taught that "high purpose, courage, honor, and independence" were leadership qualities crucial to a company's success.

You won't hear such things discussed in the best business schools today. Instead, we have a business culture that applauds executives who help themselves to big bonuses and raid other companies while sending loyal workers to the unemployment lines. 完

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Japan: A Major Industrial Power

日本・主要産業パワー

David H. Ahl

Of the world's 50 largest industrial corporations in 1982, 21 were headquartered in the U.S., 7 in Germany, 6 in Japan, and 3 each in the U.K., France, and Italy. No other country had more than two companies on the top 50. Looking at the top 500 corporations outside of the U.S., more, 134, are based in Japan than in any other country. Britain, with 87 companies on the list is a distant second, and Germany is third with 59.

In the U.S., oil companies and automobile manufacturers are among the largest; whereas in Japan, automobile and electronics companies are at the top

The Shinjuku district of Tokyo houses the headquarters of many major Japanese high technology companies.

The Creative Computing Directory of Japanese Computer Manufacturers

1983 Rank	1982 Rank Japan All Cos.	1982 Rank Int'l 500	Company	1983 Sales ($000,000)	Net Income ($000,000)	Return On Sales Percent
1	4	20	Matsushita	16,901	774.4	4.6
2	2	12	Hitachi	16,432	627.2	3.8
3	8	34	Toshiba	10,417	160.1	1.5
4	13	63	Mitsubishi Elec	6,490	145.9	2.2
5	17	80	NEC	6,131	137.6	2.2
6	24	103	Sony	4,748	127.3	2.7
7	26	109	Sanyo	4,120	115.1	2.8
8	30	132	Fujitsu	3,987	201.1	5.0
9	34	153	Sharp	3,757	125.1	3.3
10	50	212	Canon	2,833	122.5	4.3
11	63	250	IBM Japan	2,721	198.8	7.3
12	(1)	(1)	Victor (JVC)	2,468	89.7	3.6
13	73	291	Nippon Gakki	1,488	14.1	0.9
14	84	307	Ricoh	1,450	27.8	1.9
15	100	378	Pioneer	1,303	9.4	0.7
16	114	421	Oki	1,031	12.1	1.2
17	(2)	(2)	Seiko	820	(3)	(3)
18	(2)	(2)	Casio	754	29.5	3.9
19	(2)	(2)	Epson	389	(3)	(3)
20	(2)	(2)	Sord	90	4.2	4.7

(1) Victor was not included on the 1982 *Fortune* list
(2) Company was not in the International 500 in 1982
(3) Company does not publish profit figures

Note: Most companies publish financial reports with amounts shown in both yen and dollars. Where conversions were made, the rate used was ¥225 = $1.

of the list. In Japan in 1982, Nissan Motor and Toyota were numbers 1 and 3 respectively, while Hitachi and Matsushita were numbers 2 and 4. However, in 1983 Matsushita's 9.3 percent growth rate propelled it slightly ahead of Hitachi in both sales and profits. Looking down the list, eight other electronics companies are in the top 50 in Japan: Toshiba (8), Mitsubishi Electric (13), NEC (17), Sony (24), Sanyo (26), Fujitsu (30), Sharp (34), and Canon (50).

For the most part, the after tax profits of a typical Japanese firm are lower than those of a similar U.S. firm. The median return on sales for office equipment (including computer) manufacturers in the U.S. has been running around 6 percent and for electronic and appliance manufacturers, around 4.5 percent. In Japan, only IBM, Matsushita, Fujitsu, Canon, and Sord were able to achieve rates of return in this range. For the largest 20 electronics and computer manufacturers, the median was a dismal 3.1 percent. Of course, the taxation rate for corporations is much higher in Japan than in the U.S. Nevertheless, the Japanese seem satisfied with a lower profitability level, perhaps reflecting the view of Yoshino Shinji (of the Ministry of Commerce and Industry, MITI's predecessor) who said, "The purpose of business activity should be the attempt to lower costs, not make profits."

"The purpose of business activity should be the attempt to lower costs, not make profits."

Most of the manufacturers of computers in Japan are highly diversified high technology firms. In most cases, computers and peripherals account for less than 20 percent of sales. Indeed, on our list of 20 firms, only Epson and Sord (numbers 19 and 20 on the list) are in the computer business exclusively. This diversification has mixed results. It prevents companies from concentrating all their resources on computers and maximizing their R&D and marketing efforts. On the other hand, the diversification tends to reduce the sharp peaks and valleys resulting from changing market conditions in a single industry. 完

Trade Associations and Cooperation

David H. Ahl

Open the Tokyo telephone book to the heading "Associations" and you will find listings covering the next 13 pages, with 8 pages devoted to industry associations alone. The subheading, "Electrical Machinery and Apparatus" has 22 listings. Why so many associations?

We talked to Akira Furusawa, assistant general manager of the Japan Electronic Industry Development Association, and his assistant, Tsuneo Saito. They told us the main reason so many industry associations flourish in Japan is to coordinate cooperative research efforts. A project that might be too costly for one company to undertake is easier to swallow if the cost is split three ways, and even less painful if split 12 ways.

Such cooperative ventures point up a dramatic difference between the Japanese and American mentalities. The Japanese have strong company loyalties and lifetime employment with a single company. Decision-making is done by consensus—everyone must agree on important decisions. As a result, the Japanese are reluctant to take risks; and risks that are taken are shared. As Mr. Saito pointed out, "there is no place for entrepreneurs or venture capitalists in Japan."

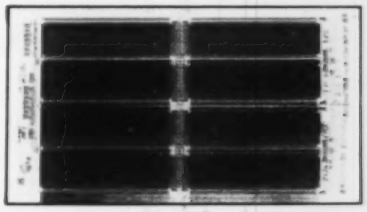
Industry associations also do market research and promote favorable legislation for their members, services performed by American industry associations as well. Until recently, JEIDA market research focused primarily on domestic markets. Lately, however, their members have been requesting information on foreign markets—another sign of the increased expectations of the Japanese in the world market for high technology goods.

Does that world market include China? Indeed it does, although Mr. Saito pointed out that a major barrier to faster expansion into China is the requirement that absolutely everything be translated into Chinese. Unlike the Japanese, whose language has become a mixture of *kana, kanji,* Arabic numerals, and English—a pragmatic mixture of convenience—the Chinese use *kanji* alone, an extremely restrictive approach when dealing with computer technology.

MSX in the Home Market

When the MSX computers were first introduced—17 are currently on the market—sales soared to the 40,000 per month level. More recently, however, sales have been falling off. Furusawa offered several reasons. Currently, very little software other than games is available, and 55,000 to 75,000 yen ($250-$340) is quite a bit for a glorified video game. Moreover, most Japanese are not as affluent as Americans, nor do they have as much space available in their homes for computers. Futhermore, many applications for home computers that are popular in the U.S., such as word processing and maintaining a database, are not practical with the Japanese language.

Reflecting the slowed sales, many retailers already are cutting prices in an effort to stimulate buying. In Akihabara, an area packed with scores of retail electronic stores, we noted discounts of more than 30 percent on the less popular MSX computers. On the other hand, the popular Sony HitBit MSX machines were rarely discounted more than a few percentage points.



256K dynamic RAM is not particularly exciting to look at, but it has sparked a major race between U.S. and Japanese producers. (Toshiba)

We inquired if either Mr. Furusawa or Mr. Saito had a computer in his home. "No, not yet," was the reply. Neither man could see any use for one at home—a curious, but perhaps not totally unexpected, response from officials of the association representing most makers of MSX computers in Japan. 完

Company Profiles

各社の横顔

David H. Ahl

While in Japan, we visited people at 13 computer manufacturers, Waseda University, ICOT (Fifth Generation Project), Microsoft, ASCII (publishers), JEIDA (trade association), the U.S. Embassy, Micro Agency (advertising agency), and nine retail computer stores. In many cases, we paid more than one visit to an organization to see different people. Needless to say, our nine days in Japan were jam packed—three to six appointments every day, discussions with Yasuko Morihara (my interpreter) between and after interviews, writing up as much as possible every night and early morning on the NEC 8201.

Fujitsu Skylab in Akihabara district is typical of computer manufacturer showrooms where prospective customers can examine and use machines before purchasing.

I filled the computer and external memory cartridge three times over with material. This turned out to be quite a nuisance Friday night as I had no way to dump it out, and I wanted an empty computer and cartridge to use over the weekend. So, first thing Saturday, I trekked over in bitter, unseasonably cold weather to the NEC Bit Inn at Akihabara. There I purchased 100 yen (44 cents) worth of printer paper (38 sheets), hooked my 8201 up to a printer, and printed out my files.

Many of the computer manufacturers in Japan operate chains of stores (usually called inns) where prospective customers can get hands-on experience with machines they are considering buying. Sord attributes much of their success to their chain of inns in which they taught people to use their innovative PIPS language. Of course, on weekends the inns fill up with youngsters writing programs, playing games, and generally hacking. As I was printing out my files, I was a source of some amusement to some of those kids in the Bit Inn—what I was doing that was funny I have no idea—perhaps they thought of me as a quaint sideshow.

In any event, although we had a free hour or so late one Monday and early one Wednesday, we were unable to see every Japanese computer manufacturer. We think we got a good flavor of what is going on, but if we missed something important, we apologize. Please don't get the idea that the companies that do not have separate writeups are unimportant—nothing could be further from the truth—it is just that we couldn't see everybody. Following are some random facts about four of the companies we did not see in Japan.

Office buildings in Shinjuku-ku house the headquarters of Canon, Casio, Sharp, and many other companies.

YAMAHA

Nippon Gakki is not a familiar name; their brand name is Yamaha. The company is one of the largest manufacturers of musical instruments, manual and electronic, in the world. It is only in the past year that Yamaha has gotten into the computer business with the introduction of three MSX machines. Emphasizing their musical heritage, Yamaha has produced an interesting line of keyboards and music composition

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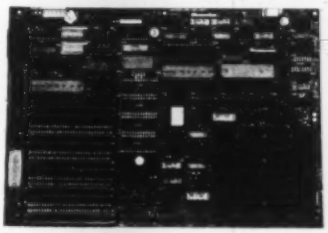

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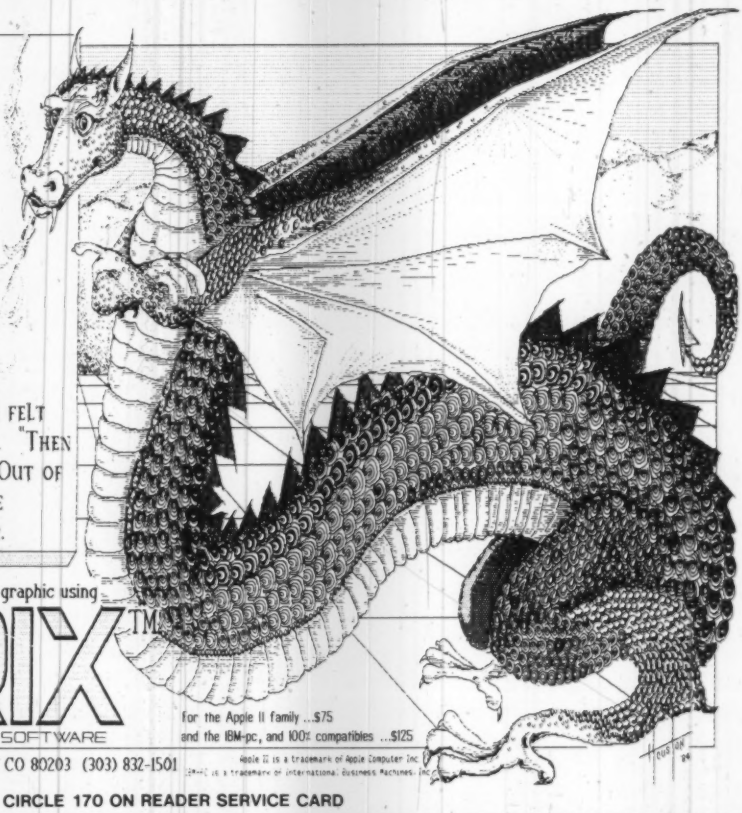
CIRCLE 168 ON READER SERVICE CARD

JUST THEN, THE DRAGON SPOKE, ITS VOICE WARM AND DRY AS THE DESERT WINDS, CARVING EACH WORD FROM THE SHIFTING SIBILANCE OF ITS WHISPER. "AND WHAT IS IT, MY ADVENTUROUS FRIEND, THAT YOU WISH YOUR SOFTWARE TO DO?"

"JUST ABOUT EVERYTHING." I REPLIED. (HAD THE ORIGINAL REQUEST SOUNDED AS ARROGANT AS THE RETURNING ECHO?) I GAVE THE MOUSE A LITTLE SHOVE WITH MY FINGER.

"AHH...", THE DRAGON SMILED, AND I FELT THE HEAT OF ITS BREATH WASH PAST ME. "THEN I THINK YOU'D BETTER HAVE FONTRIX." OUT OF THE CORNER OF MY EYE I COULD SEE THE BEDOUIN TRACE A QUICK SIGN IN THE AIR.



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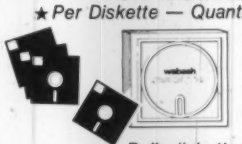

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software for their computers. As a result, according to the editor of *MSX Magazine*, Yamaha has some of the best-selling MSX computers today. This was evident as I visited the retail computer shops; the Yamaha machines always had crowds around them and were rarely discounted.

SANYO

Sanyo is the seventh largest electronics manufacturer in Japan with sales of over $4 billion. They are deeply involved with video, audio, household appliances, solar systems, factory automation, and electronic components as well as computers and office automation products. More than 62 percent of Sanyo's sales comes from outside of Japan with 45 percent of that coming from the U.S.

Major personal computer products sold in the U.S. include the 8-bit MBC 1100/1200 machines, 16-bit MBC 4000/4050, new MBC 550/555 (see review in an upcoming issue), CRX 1100 CRT display, and PR 5500 daisywheel printer.

The company also makes an MSX machine, the only one with a built-in light pen, and several smaller home computers which are sold in Japan and Europe but not the U.S.

JVC

The Victor Company of Japan (JVC) is a powerhouse in video products, particularly TV sets and VCRs. Their first computer entry is an MSX machine which, at this point, is not slated for the U.S. market. Reflecting their heritage in video, Victor makes a line of video-oriented peripheral equipment including a low-cost video mixer. This allows the signal from the computer to be superimposed on a video signal from a TV set, VCR, or other source. At the moment, there is little software to take advantage of this capability, but we expect to see some in the near future.

In November 1983, JVC announced their entry into the U.S. peripheral market. Initially, products will be sold to original equipment manufacturers (OEMs) and not to end users. Products include CRT displays, hard and floppy disk drives, a cassette data recorder, floppy disks, and other components.

EPSON

"Plain English keyboard" and Valdocs operating system make Epson QX-10 exceptionally easy to use.

Epson Corp. is part of an international conglomerate, perhaps the most widely recognized member of which is the 100-year-old Seiko Watch Company. Epson Corp., one of the youngest members of the Seiko group, was established in 1961 as Shinshu Seiki Co. to manufacture watch parts for Seiko. In 1968, Epson put its first non-watch product on the market—the EP-101 printing head for electric desktop calculators. It was the first calculator printer made.

In 1983, Epson had annual sales of $389 million, 48 percent of which came from outside of Japan. One-third of corporate sales come from the U.S. Today, 52 percent of corporate sales come from computer products, up from just 2 percent in 1977. The company is the leading manufacturer and marketer of dot matrix printers in the world. Interestingly, another major maker of dot matrix printers, Seikosha, is also part of the Seiko group.

World Trade Center Building, Hamamatsucho railroad station, and main rail line in southern Tokyo. Note the monorail line in the left foreground.

Epson exports six printers, two computers, a floppy disk drive, and an acoustic coupler to the U.S. The first computer made by the company, the HX-20, was the first notebook portable introduced. The computer has done reasonably well in Japan and Europe, but has been eclipsed by the Tandy Model 100 in the U.S.

The Epson QX-10 desktop computer uses the unique Valdocs operating system developed by Rising Star Industries (see *Creative Computing*, June 1984) which is exceptionally easy to use. Rising Star is a rather interesting concept; its president, Chris Rutkowski, described it as an "artist's stable in which some of the brightest minds could be brought together to work on this integrated software system called Valdocs. It was set up so they could work their own hours, in their own homes, on the parts of the project that most interested them, and they could share financially in the product."

Conceptually, the Valdocs operating system is quite different from CP/M or MS-DOS; Epson describes it as "human compatible." Perhaps as a result, the QX-10 is the best selling Japanese computer in the U.S. today. But Rutkowski feels that it could and should do even better.

Like many Japanese companies, Epson has a curious marketing philosophy which, to some extent, may be responsible for their computers not selling better in the U.S.

Canon

The name Canon is generally associated with cameras, and with good reason: Canon today is the largest producer of 35mm SLR cameras in the world. Nevertheless, the other operations of the company have grown to the point where photo-related equipment accounts for just one-third of total corporate sales.

On 1983 sales of $2.8 billion, Canon earned $122 million, a return of 4.3 percent. Of total sales, 70 percent is outside of Japan, and 34 percent comes from the United States.

The photo sector has been growing the slowest and, in fact, from 1982 to 1983 declined by 2.3 percent. On the other hand, the sales of copiers and "other business machines" are growing rapidly. Computers are lumped into this "other" category and account for something less than 5 percent of corporate sales although sales growth was more than 40 percent last year.

In contrast to many other Japanese companies, Canon USA is quite independent. Ornery, too. Over the years, we have repeatedly requested Canon products for review and have never had a single letter or phone call answered. In Japan, however, Yoshiaki Niizawa and Tomio Hirao of the small business computer division were most courteous and helpful. We wish this attitude could be communicated to the folks in the U.S.

The two low-end computers in Canon's lineup, the X-07 notebook portable (see *Creative Computing* January 1984) and the new V-10 MSX machine, are not marketed in the U.S. However, the 16-bit AS-100, a sophisticated personal business computer is available in the U.S. The AS-100 includes Canobrain integrated software (spreadsheet, database, and graphics); it is also able to run software packages under MS-DOS, CP/M-86, and the UCSD p-system, as well as Canonword, a very nifty word processing package.

Recently announced at the Japan Data Show was Canonet, a local area network with amazing imaging capabilities. Of course, personal computers can tie in to the net, as can a new handheld device for capturing data from remote locations.

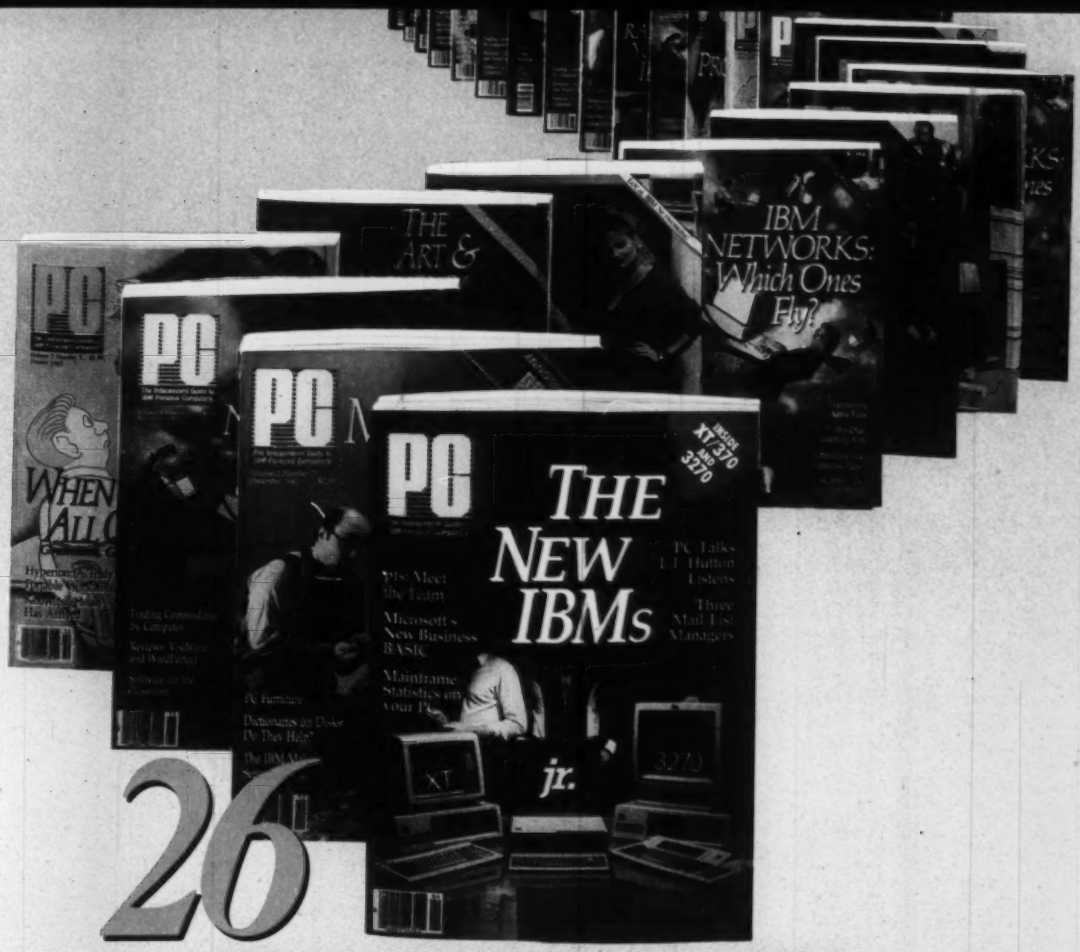
Combining optical and computer technology is Canon's integrated electronic filing system. This includes a document reader, high definition laser printer/copier, optical laser disk, and electronic microfilm storage/retrieval device.

Canon AS-100, a powerful 16-bit computer, is the heart of the new Canobrain system.

Yoshiaki Niizawa, general manager, and Tomio Hirao, manager of the Small Business Computer Division of Canon.

Also part of Canonet is a multi-function workstation which provides image handling on a 896 x 1196 pixel display, data processing, word processing, and communications. The display has multiple windows, and utilizes icons and a mouse. It also permits final page makeup with any type size and font, and insertion of graphics and charts, with final reproduction being to a high definition laser printer. Apple Macintosh, move over. Actually, Niizawa admitted to liking the Macintosh, although he felt that color would have been nice for graphics.

We are impressed with Canonet and the AS-100—now if Canon USA can just get its marketing act together perhaps the potential of these products can be realized.



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CASIO

Casio is a leading manufacturer of electronic watches, calculators, electronic musical instruments, cash registers, and personal computers. Sales in 1983 were $754 million, an 8 percent increase over 1982. Net income was $29 million, a 3.9 percent return on sales. Nearly two-thirds of Casio's sales came from countries other than Japan, with the U.S. accounting for 18 percent.

The largest product line is calculators and, because that product line is so influential in the company, several low-end computers are considered part of the calculator line.

The calculator line consists of a wide variety of "four function" calculators, two scientific units, nine programmable (Basic) units, and the FP-200, a notebook computer with built-in spreadsheet and Basic software. Computers include the PV-2000 (a game-oriented machine), the FP-1000 and 1100 (Z80A-based CP/M machines), and the FP-3000 (a 16-bit MS-DOS machine). Of the computers, only the FP-200 and 1000 series are sold in the U.S., and if our experience is any guide, the marketing of them is half-hearted at best.

This opinion is consistent with the views expressed by Hiroshi Kobayashi and Norihiko Yoshida with whom we talked in Japan. They feel that the greatest opportunities for Casio lie in powerful calculators with computer capabilities, a market shared primarily by Casio and Sharp, rather than in the overcrowded computer field.

Casio does not plan to market an MSX machine, primarily because they see it as a game unit and, for other applications, it does not measure up to 16-bit machines. They are even taking a cautious approach introducing their MS-DOS computer in the U.S. because it is not fully IBM-compatible, something they see as necessary to compete effectively.

Casio FP-200 has spreadsheet and graphing language built in along with Basic.

Norihiko Yoshida and Hiroshi Kobayashi of the public relations section of Casio.

Mixed Feelings About Integrated Software

Casio is also approaching integrated software with caution. While they see it as a good concept, they feel it must be easy to use and not add unduly to the cost of the machine. Furthermore, they don't want users to look at a computer and think, "I don't need all of that capability; why should I pay for it?"

The Apple Macintosh? "It's okay, but it should have color." The FP-3000, Casio's 16-bit entry, is designed to accept input from a mouse, but no software has been developed to use one so far.

Managing the U.S. Operation

Managing the U.S. operation is a mixture of a once-a-year meeting with top U.S. managers and placing a few Japanese in key positions. Beyond that, the U.S. managers are free to run the operation as they see fit.

On the other hand, we found it curious that all manuals and brochures are written and produced in Japan. Apparently, Casio feels that a direct translation from Japanese is suitable for the U.S. and Britain, a decision we seriously question.

But perhaps we are wrong. Casio's earnings have been increasing steadily over the past five years and, despite the recent economic downturn, increased 26 percent from 1982 to 1983. Just imagine what they might do in a good year!

One sure way to lose a game forever is to win it.

The trouble with most games?

Just when you're good enough to win, the challenge is gone. And a fun game becomes a boring game.

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We admit it. WizType™ will teach you to type. From 20 to 120 words a minute, you choose! Now, isn't that what you need to operate your computer fastfastfast?

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Or to race with Bung, the jester, from line to line. In fact, you can even put in your own words to foul up your friends.

At last. A game that stays one step ahead of you.

When you win WizType,™ you're not going to get bored.

Because, game after game you can turn up the challenge. And then have the fun of beating The Wizard of Id's characters on the next level.

Is it the best typing tutor? Or a nearly perfect game?

You decide. WizType™ is a challenge every step of the way, so you won't have to worry about another game packing it in.

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FUJITSU

Fujitsu is the largest computer manufacturer in Japan with annual sales (1983) of $4 billion. Net income was $201 million, about a 2 percent return. Nearly 28 percent of corporate sales come from outside of Japan with 57 percent of that coming from the Americas. Since Fujitsu has just recently introduced its microcomputer in the U.S., sales here are relatively insignificant at this point.

The semiconductor and electronic components group is the fastest growing in the company, sparked particularly by the sales of 64K RAM chips in overseas markets. Fujitsu has delivered trial quantities of several varieties of 256K chips and expects this business to be quite important in the next few years.

Fujitsu is divided into four divisions of dramatically different size: data processing (Facom mainframe and supercomputers; 59 percent of corporate sales), telecommunications (18 percent of sales), electronic components (16 percent), and car audio (5 percent). In the supercomputer area, Fujitsu is one of the few companies giving Cray and CDC a run for their money.

Fujitsu is an enthusiastic participant in the Fifth Generation Project, but Hiroyuki Nishimi, general manager of the semiconductor marketing division, expects the main beneficiaries to be mainframe computers. Although he and Yoshiharu Ichida, manager of overseas marketing, believe that in the future microcomputers increasingly will be hooked into mainframes which may employ advances from the Fifth Generation Project, they do not see these advances being implemented directly on the micros.

The low-end Fujitsu product line is quite broad starting with the FM-X, one of the lowest priced MSX computers. Next up is the FM-7, a 6809-based machine. The FM-8, uses one 6809 for the cpu and a second one for display and I/O control.

The FM-11 is based on the 16-bit 8088; two versions offer either floppy or hard disk. Fujitsu offers a complete line of peripherals for the FM series: disk drives, bubble memory cartridges, displays, light pens, and interfaces.

The top-of-the-line microcomputer is the Micro 16s, a dual processor (Z80A and 8086) offering either MS-DOS or CP/M-86 (see *Creative Computing*, March 1984). this is the only Fujitsu micro sold in the U.S. at present. Fujitsu feels that the current generation of MSX computers is unsuitable for the U.S., but that the addition of a disk drive might make them more viable. They, like so many other Japanese manufacturers are obsessed with IBM and think that IBM compatibility is almost a prerequisite to selling computers in the U.S. However, they worry about copyright problems and, oddly enough, whether IBM is going to survive in the small business market.

Ichida expressed the view that integrated software is quite important, both in Japan and abroad. He lit up at the mention of the Apple Macintosh and waxed enthusiastic over the quality of the display and 512K of memory. "What about the mouse?" we inquired. "It's nice, but not essential," was the reply.

Like many other Japanese companies, Fujitsu leaves their American operation alone as much as possible but admits to setting goals and overall direction in Japan. We found it interesting that in "our" interview, Fujitsu asked as many questions of us as we did of them. That is the mark of an open-mided, receptive company; no wonder they are number one in Japan.

The man in the sunglasses is the symbol/spokesman for Fujitsu low-end computers. Fujitsu executives would not allow their pictures to be taken, preferring, instead, that we use the corporate symbol.

HITACHI

You may think of Hitachi as the name on your TV set or auto sound system, however, those areas of business are nits in the $16.4 billion corporate empire of Hitachi. Indeed, the company is so large, that it has set up a separate subsidiary, Hitachi Sales Corp., just for marketing its consumer products—a subsidiary which, with $3.2 billion in sales, is larger than most primary manufacturers. In 1983, the overall corporation earned $627 million for a 3.8 percent return on sales.

Hitachi puts out a 162-page booklet just to describe briefly its products. The company makes all types of power plants, chemical plants, motors, generators, control equipment, construction machinery, locomotives and rolling stock, pumps, industrial robots, elevators, escalators, TV stations, scientific and industrial instruments, medical equipment, home appliances, sound equipment, semiconductors, electronic devices, and computers. The computers range from the S-series supercomputers to home-oriented systems.

In 1983, Hitachi derived $3.8 billion, 23 percent of its annual sales, from computers and communications products. This area grew at 14 percent per year, one of the highest growth rates in the corporation.

Hitachi has three divisions involved with making computers. The computer division makes large mainframe machines; the office systems division makes small business computers (minis) and business personal computers (micros); while the home division makes hobby computers including two low-end MSX machines, the H1 and H1E.

Shigero Yokoyama, manager of the office systems division, told us that at present Hitachi does not think that the U.S. represents the best export market for their computers. As far as MSX is concerned, they plan to wait and see what kind of reception it gets in Europe.

Cornerstone of the office systems division is the B-16, a 16-bit 8086-based unit with floppy or hard disk. Although it runs MS-DOS and CP/M-86 and even has a Hitachi-produced integrated software package, Ofis/Pol, Hitachi believes that IBM-compatibility is necessary for success in the U.S., a view that seems to be shared by a majority of the Japanese makers with whom we spoke.

Shigero Yokoyama, manager in the Office Systems Division of Hitachi, explains their product strategy.

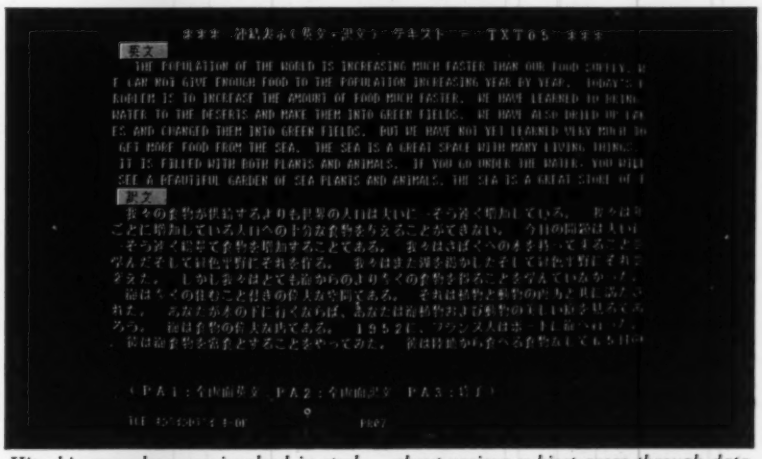
Yokoyama thinks that integrated software is important and necessary for office computers in the future; indeed, again and again in our discussion, he emphasized the importance of software. Even regarding the Fifth Generation Project, to which Hitachi has several researchers assigned, Yokoyama believes that unless it produces practical software, it will have little impact on the use of small business computers.

Like several other people with whom we spoke, Yokoyama thinks that the Fifth Generation Project will have its greatest impact on supercomputers and that it will be difficult to apply the results to smaller computers. He also made the interesting observation that most people, even Japanese computer industry managers, do not really understand the Fifth Generation Project in any depth.

Currently in the computer field, Hitachi sees the greatest opportunities in manufacturing OEM components—semiconductors, particularly high capacity memories, along with displays and disk drives. They also see a good future for home computers, although they have no firm idea of when this market might take off.

We took a quick tour around the Hitachi showroom and made the appropriate oohs and ahs at the fancy equipment. One machine which particularly caught our eye was the HitFile 60. This is a videodisc storage and retrieval system, completely computerized, with a display terminal capable of displaying a document (like a microfilm reader) along with a menu of icons (like the Macintosh). Oh, yes, it uses a mouse too. The attached printer/copier reproduces documents with exceptional resolution. We sure would like one of these in our office, but alas, Hitachi has no plans to export the device.

Incidentally, Yokoyama took pains to write out in English the name of the U.S. affiliate, Hitachi America, Ltd. and then said, "Look at those letters—H-A-L—does that mean something to you?" We weren't quite sure whether he was referring to the computer in *2001* or one ahead of IBM—or perhaps both.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IT IS FILLED WITH BOTH PLANTS AND ANIMALS. IF YOU GO UNDER THE WATER, YOU WILL
SEE A BEAUTIFUL GARDEN OF SEA PLANTS AND ANIMALS. THE SEA IS A GREAT STORE OF F

Hitachi researchers are involved in studies of "knowledge bases" that will be able to integrate new perceptions and rules derived from real world experience. Such systems will be able to answer questions about various subject areas through data combination and inference. One application of such systems is natural language recognition and translation as shown on the screen above.

Matsushita Electric

In 1983, Matsushita edged pass Hitachi to become Japan's largest electronics manufacturer and the second largest company in the country (behind Nissan Motors). In 1983, sales were $16.9 billion and net income was $774 million for a 4.6 percent return—well above average for similar companies.

Overseas sales account for 47 percent of total corporate sales. Matsushita has been active in the U.S. for more than 30 years and today is a leader in the VCR and audio equipment market.

There is virtually no product on which the name Matsushita appears; instead the company uses four brand names: National, Panasonic, Technics, and Quasar. The company is divided into six major divisions: video equipment, audio equipment, home appliances, communications and industrial equipment, energy and kitchen-related products, and electronic components. The communications and industrial equipment division includes computers, peripherals, copiers, telephone equipment, and factory automation equipment. In 1983, this division accounted for 15 percent of corporate sales and had the highest growth rate, 27 percent, in the corporation.

In Japan, Matsushita offers a range of word processing machines, point of sale terminals, and personal computers including handheld units, an MSX machine, and 16-bit business systems. However, success in the U.S. computer market has eluded the company to date. Although we were very impressed with the JR-200 in our review, it never achieved widespread distribution and was recently withdrawn from sale. The handheld computers, marketed by both Panasonic and Quasar were also good performers that never did anything in the U.S. market. Nevertheless, S. Fukushima, general manager of the information equipment department in Osaka, told us that the handheld machines would continue to be emphasized. Design goals include making them even smaller and enlarging the single line display.

Fukushima also recognizes the importance of software and believes that no computer can possibly succeed without the "right" software.

Despite mediocre results in the past, Matsushita once again appears to be making a determined effort to get into the U.S. market, this time with computer peripherals and an IBM PC compatible portable computer. In late March, Ken Kurahashi, president of Panasonic Industrial Company, announced a new daisywheel printer, three new dot matrix printers, and three new monitors. The line now includes eight monitors, five dot matrix printers, two plotters, and a daisywheel printer. Kurahashi also hinted that an optical disk memory device, currently being marketed in Japan, might be introduced here in the future, but made no promises.

The Panasonic Sr. Partner portable computer boasts impressive specifications: 16-bit 8086 mpu; 128K; low profile 360K double sided, double density floppy drives; high-resolution 9" display for text or graphics; built-in thermal printer; and ports for RGB monitor, parallel printer, RS-232 device, and option board. Also, $1500 worth of software is bundled in. (Yes, we have asked to borrow one for review, but have not received a response—perhaps indicative of Panasonic's marketing in the U.S.)

On the other hand, Kurahashi had some strong words about Matsushita's commitment to the office automation market when he recalled the beginnings of the company. In 1918, Konosuke Matsushita was peddling electric sockets, and it wasn't going well. But he had sunk every cent he could raise—about $50—into the venture. Realizing he had been thinking too much about selling and not enough about what customers wanted, he went back to the drawing board and designed a two-way electric socket that was better than anything else on the market. This was the beginning of the Matsushita creed, "the commitment to build a better product at a fair and reasonable cost to customers."

Kurahashi went on, "From that beginning he built a $17 billion company. That's commitment."

Matsushita's personal computers range from small business systems to home units to portable models.

MITSUBISHI

Mitsubishi Electric Corp, one of several companies bearing the Mitsubishi name, is a giant of a company with 1983 sales of $6.5 billion. Earnings were $146 million for a 2.2 percent return on sales, the lowest since 1979.

The company is divided into four major product groups: heavy machinery, electronic products and systems, industrial products, and consumer products. Fastest growing (14.2 percent annually) is the electronic products group with $2.4 billion sales in 1983 (36.2 percent of corporate sales). This group includes semiconductor products, computers, and satellite communications. A $96 million investment in the semiconductor segment strengthened production capacity to the point where Mitsubishi is now the worldwide leader in 64K RAM chips.

Mitsubishi makes a complete line of small computers. At the low end is the ML-8000 MSX computer, one of the few in relative short supply. Nevertheless, despite its success in Japan, the company has no immediate intention of selling it in the U.S., preferring to wait and see how it does in the U.K. Furthermore, Suketaka Tachibana, manager of the group that handles it, thinks that it is risky to export anything to the U.S. that is not IBM compatible—even a low-end machine.

One step up is the Multi 8, a capable Z80A-based machine that has found good acceptance in Japan, but for which there are no U.S. plans. Nor will the Multi 16, an 8088-based computer, be introduced to the U.S. market even though it runs CP/M-86 and MS-DOS and boasts a comprehensive line of applications software.

Instead, Mitsubishi is relying upon a joint venture with Sperry for penetrating the U.S. market. The computer, made by Mitsubishi under an OEM contract, is completely compatible with the IBM PC.

We were very impressed with the insight of Toru Tsuruta, planning manager of office automation marketing. He is one of just two people with whom we spoke who has a personal computer (actually two of them) at home. He thinks that access to on-line databases is very important. "It is quite troublesome," he said, "to input data by hand. Without easy access to an on-line database, integrated software is of little use."

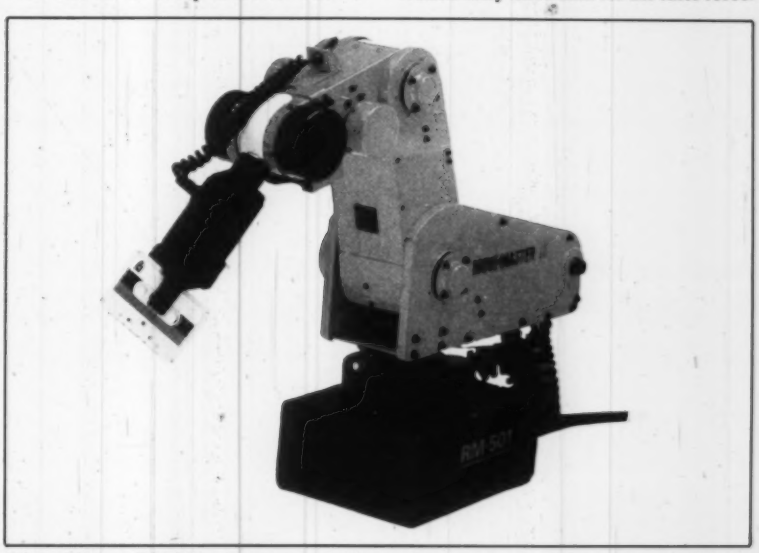
Thus, he thinks that the Apple Macintosh is "very interesting, but not particularly useful" because of its lack of good data communications capability. Nor is he enthusiastic about the mouse and icons, because "the system is not as accurate as keys and it is difficult to remember the meanings of the three buttons on the mouse." On the other hand, he thinks the mouse is probably good for CAD applications, but not office work.

Tsuruta is not anti-Apple at all; indeed he boasted that he was the first person at Mitsubishi to use an Apple almost four years ago. He got it hooked into a mainframe—no easy task—and downloaded daily sales data for his sales force. "They loved it," he reported.

Tsuruta is also proud of Mitsubishi's robot products. The RM-101 Move Master is aimed primarily at educational institutions and experimenters and sells for under $1700. A more capable, but still entry level assembly line robot, the RM-501, sells for under $5000, about the same, he noted, as the annual salary of a part-time assembly line worker.

Although telvision products fall under the consumer products group, we were impressed enough with the newly-announced television printer, a 280 x 234 dot thermal printer with a built-in frame grabber, to buy one on the spot. Not yet introduced in the U.S., the SCT-P50 sells in Japan for just over $300. Although the resolution is on the low side, it produces an excellent 4" x 3.3" image.

At this point, Mitsubishi is not a well-known brand name in the U.S. However, given the innovative nature of their products, we think that will change in the near future.



Move Master RM-501 robot comes with an interface box to connect to the RS-232 serial or Centronics parallel port of any personal computer.

Toru Tsuruta, manager of the Office Automation Marketing Planning Division of Mitsubishi, is one of the only people with whom we spoke who has a computer of his own.

NEC

NEC Corporation, founded in 1899, is one of the world's leading suppliers of communications systems, computers, industrial electronics, electron devices, and home electronics products. In our meetings with Messrs. Hamada, Senda, Okuwa, and Igarashi of NEC, they emphasized the increasing importance of "C&C" systems which integrate computer and communications technologies. They expect such systems to be the backbone of the company in the coming decades.

Sales of NEC in 1983 totaled $6.1 billion, a 15 percent increase over 1982; net income was $138 million for a 2.2 percent return on sales. Computers and industrial electronics account for about one-quarter of corporate sales. Nearly 34 percent of NEC's sales come from outside Japan, although only 10 percent of the sales of the computer group come from abroad.

This is perhaps understandable considering that NEC dominates the desktop computer market in Japan (70 to 75 percent share), and is a major force in the mini, mainframe, and supercomputer markets as well.

NEC and Sharp, the two leading makers of low-end systems in Japan, have both ignored the passing of the MSX bandwagon. Shunzou Hamada, general manager of the personal computer division, does not believe that MSX will truly become a standard because it tends to be game oriented and the graphics resolution is relatively low. He does not think that the addition of disk operations will help, and, while he didn't rule out the possibility of NEC producing an MXS machine, we got the impression it was very low on their priority list.

NEC has a strange organization in the U.S. The charter of NEC Home Electronics in Illinois is to market home-oriented products, yet they have the PC-8800 desktop system (see *Creative Computing*, November 1983) and PC-8201 notebook portable (see *Creative Computing*, January 1984). NEC Information Systems in Boxborough, MA has responsibility for the 16-bit Advanced Personal Computer, Spinwriter printers, and disk drives. Both divisions have a fair degree of independence, although they must meet the targets and goals set in Tokyo.

While the APC uses MS-DOS and is functionally compatible with the IBM PC, Hamada admitted that it is not operationally compatible. While he sees such compatibilty as desirable, he feels strongly that to be successful, a computer must offer advantages beyond just being a cheaper version of the IBM PC. "In Japan, such compatibility is not particularly important," he said, "since NEC already has 75 percent of the 16-bit market."

Hamada thinks that integrated software will be increasingly important in the future. But, he said, there are two levels of integration—tightly integrated (like *Lotus 1-2-3*) and loosely coupled (packages that create and access common files)—and it is necessary for a manufacturer to offer both.

"What about the Apple Macintosh?" we asked. Hamada opined that it wouldn't sell in Japan since buyers of desktop business machines all demand color. Furthermore, while icons and the mouse are nice concepts, few business packages need them and few even benefit from them.

While none of the people from NEC with whom we spoke would say much about the future except "C&C," Hamada said that in the low-end market, the notebook portables probably represent a greater opportunity for NEC at present since that sector is not currently dominated by IBM and clones.

In general, we were very impressed by Hamada's understanding of the entire personal computer market, both in Japan and abroad. Perhaps contributing to this understanding is the fact that Hamada is the second of the two Japanese executives with whom we spoke who has a personal computer of his own. Does that say something?

Kunio Okuwa, manager, and Shunzou Hamada, general manager of personal computer marketing.

My NEC 8201 with 8206 expansion RAM cartridge served me well on my three-week trip to the West Coast and Japan.

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OKI

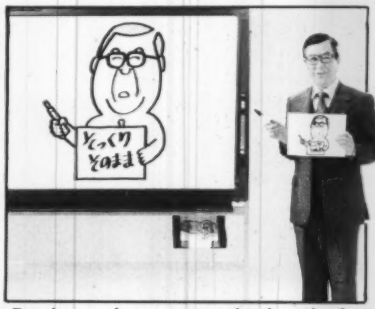
In the U.S., the name Oki is generally associated with dot matrix printers and, indeed, Oki is the second largest manufacturer of the devices behind industry leader Epson. On the other hand, in Japan, Oki is probably better known for its telephone products and banking systems.

In 1881, five years after the invention of the telephone, Oki Electric was established to manufacture telephones and switching and transmission equipment. In 1983, communications systems accounted for 29.7 percent of Oki's annual sales of $1 billion. Overseas sales of telecommunications equipment, particularly for mobile communications, have been rising sharply.

The data processing group, accounting for 52.7 percent of sales in 1983, was recently split into two groups: data processing and office automation. The data processing group makes banking systems, EDP systems, building control systems, terminals, and printers. This group has been growing at an impressive 20 percent annual rate with an astonishing 134 percent growth rate in sales abroad. Today, sales in the U.S. account for 11 percent of the total.

The office automation group is responsible for office computers, personal computers, word processing systems, facsimile equipment, telcom equipment, and a new product, the "Electronic White Board." This innovative product looks like a large, free-standing blackboard painted white. The writing area is 3′ x 4′. After writing or drawing whatever you want in whatever colors you like, you can press a button and get a reduced 8½ x 11″ copy. What a boon for business meetings, seminars, and any kind of instruction. Price is about $3400.

Oki's Electronic Devices Group is the smallest, accounting for 15.9 percent of corporate sales. Much of the emphasis of the group is on CMOS devices, and Kakugoro Suzuki, general manager of engineering planning was proud to note that Oki is the largest producer in the world of digital watch chips.



Brochure shows new whiteboard that prints reduced copies of images drawn on it.

Oki is a heavy spender on research and has several researchers assigned to the Fifth Generation Project. However, the major thrust of internal research is on the integration of communications and computer technology. Oki intends to be a major supplier of equipment to Nippon Telegraph and Telephone for the soon-to-be-installed nationwide information system.

New Portable Computer for U.S. Market

In computer products, the only items currently being sold in the U.S. are the Microline series of printers. These include the Microline 80, 82A, 83A, 84, 92, 93, and high speed 2350 and 2410. These reliable workhorses should be familiar to most readers.

When we asked about future products intended for the U.S., we were prepared for the usual answer of, "We're working on many things, and we can't tell you about any of them yet." My jaw must have dropped when Suzuki and Akira Miki, general manager of business planning, said, "We plan to introduce an IBM-compatible portable computer by the end of 1984." Not transportable, but fully portable (smaller than an attaché case) and battery operated, the machine will have minifloppy drives and an LCD display. "How big?" we asked. A little hemming and hawing. We said, "More than eight lines?" Exchange of glances. "Oh, certainly," said Miki.

What did they think of the Apple Macintosh? There was general consensus that it was an "excellent computer," but they thought that IBM-compatible systems were a significantly greater marketing opportunity. Nevertheless, they agreed that in the future we would be seeing more Macintosh-like machines with multiple functions, although they think it is quite important for such machines to connect easily to a larger host computer and act as multi-function workstations. And perhaps they are in a good position to judge; among all the companies we visited, Oki was one of the most heavily computerized with one machine for every three people—a most impressive ratio.

Oki assembled an array of managers and staff experts to answer our questions. They include Messrs. Suzuki, Miki, Ohmata, Kiryu, and Suzuki.

PIONEER

As we took the rather complicated subway and train trip to Pioneer from Oki, I explained to Yasuko that Pioneer was a strange company. They have developed many innovative products, but their marketing of other than audio products in the U.S. has been spotty at best.

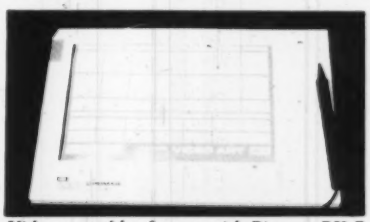
As long-time readers know, for nearly ten years, we have been enthusiastic about the possibilities of videodiscs coupled with computers. But Pioneer has insisted upon positioning their videodisc player as a competitor to videotape (dumb) instead of as an interactive device (smarter) or a computer peripheral (smartest).

Anyway, we arrived at Pioneer with mixed feelings. Our first few minutes did nothing to dispel those feelings. The person with whom we thought we had an appointment was unavailable and knew nothing about us. "What did you want?" enquired a public relations type. Many phone calls and bows later we found the right person—with whom we truly did have an appointment—Fusao Murakami, general manager of the systems product division. And did he give us a show!

The first thing we were handed at practically every company we visted was an annual report. In sharp contrast, Murakami rushed us into a demo room stuffed with equipment. There, he and Yoshikiyo Arai of the corporate planning division gave us a demonstration of Pioneer's MSX computer and related peripherals.

Marriage of Videodisc and Computer

You are watching "Star Wars" and wishing you could help Luke as he tries to shoot down the X-wing fighters from the Millenium Falcon. Remember that scene? It's vivid! Fighters are swooping in from all directions. Luke swings the cannon platform around and fires. Zap! Blam! Another fighter explodes in a vivid flash. Didn't you wish you were there? I did.



Video art tablet for use with Pioneer PX-7 MSX computer.

And at 11:48 a.m. on the eighth floor of a modern building in Meguro-ku, I was there. I couldn't believe it: fighters were swooping in and weaving and dodging. . .then I was in a canyon. . .then I was dodging laser fire from the surface of the planet. . .then I was approaching a strange planet (was it friend or foe?). No, folks, these weren't computer graphics, they were "live," video scenes with the viewport of my fighter (computer generated) overlaid on the scene. A $10 million simulator? No, a $450 MSX computer coupled with a standard Pioneer videodisc player. (Incidentally, the scenes aren't really from "Star Wars;" they are specially made for the disc, but they are as professional as any I have seen.)

If you have a videodisc player, perhaps you have "played" the mystery disc, "The Many Roads To Murder." It's an intriguing disc and, after completing its 16 mysteries, you wish there were more. Now there are. The software with the Pioneer PX-7 MSX computer allows you to write or rewrite your own mysteries—or any other adventure game for that matter.

As if this weren't enough, Pioneer has developed a fantastic drawing tablet with a complete software system for mixing video and computer signals and programs. We snapped several photos of this system in action. It has the ability to produce titles, do ten different video dissolves, and much more. It is almost impossible to describe the capabilities of such a system with words.

Oh yes, we finally did get an annual report. Pioneer is a $1.3 billion company with $9.4 million earnings, a meager 0.9 percent return. But our experience may be revealing—an almost-missed appointment, fantastically innovative products, senior managers who care first for products and second for formalities, and a U.S. organization that marches to a different drummer.

I happen to be a technology junkie, and I have more Pioneer products in my house than those of any other company (projection TV, videodisc player, receiver, etc.) but I am hardly typical. However, I have the feeling that with a bit of marketing, Pioneer could be a truly major force in the U.S. How about it, Pioneer North America?

While a program loads from videodisc to MSX computer, instructions and a demonstration of game play are shown from the videodisc.

Computer graphics can be superimposed on a videodisc image to produce some stunning effects.

SHARP

Sharp makes a wide range of industrial and consumer electronics products including instruments, industrial robots, solar systems, copiers, business machines, TV sets, audio components, household appliances, calculators, and computers. In 1983, the company earned $125 million on sales of $3.8 billion. Electronic components account for 35 percent of total sales. Computers are not broken out separately; we estimate that they account for between 5 percent and 10 percent of total corporate sales.

Among Japanese producers of pocket computers, Sharp is the unquestioned leader with roughly 70 percent of the total market, whereas in desktop machines, Sharp is in the number two position (23 percent share) behind industry leader NEC.

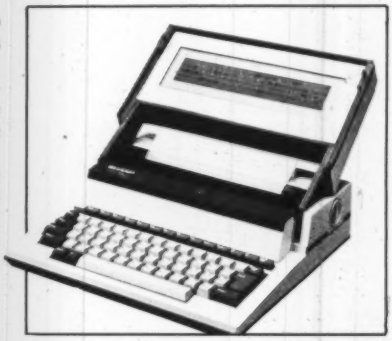
The company makes a wide range of machines including four pocket computers, the PC-5000 notebook portable (see *Creative Computing*, January 1984), the 8-bit MZ-2200, the 16-bit MZ-5500, 16/32-bit OA-90, and the X-1 integrated computer/video system, as well as several dedicated Japanese word processing systems.

Although many of these machines are available in the U.S., the company is putting the most emphasis on the pocket computers, the PC-5000, and, to a lesser extent, the MZ-5500. We also expect to see the X-1 receive additional emphasis in the near future.

In our review, we were very enthusiastic about the PC-5000 although we have been disappointed that it is not more widely available.

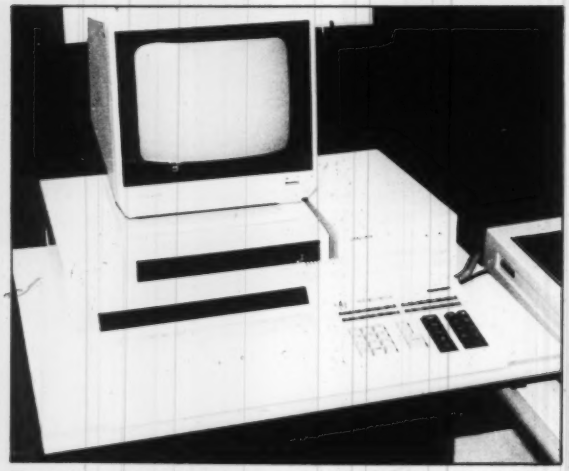
However, the MZ-5500 may be the real sleeper. This 8086-based machine has multi-window capability and can show up to four windows of text, tables, or graphics images simultaneously on its high-resolution display.

Several Japanese manufacturers have shown integrated computer/video systems with the ability to combine a video signal (off the air, VCR, videodisc) with a computer signal. As yet, few applications have been developed for such systems (except some by Sony), however, we expect to see increasing interest in systems like the Sharp X-1 in the near future.

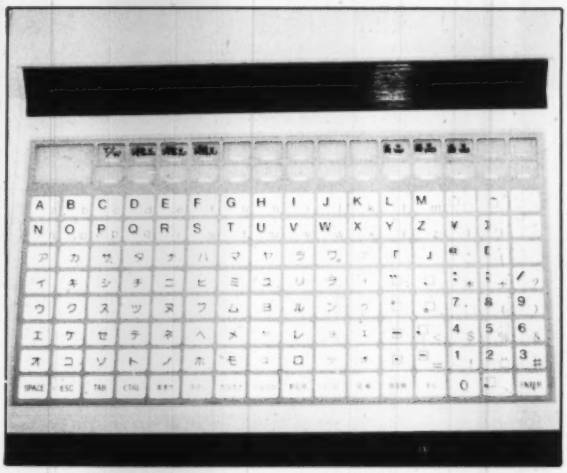


We were very impressed with the portable Sharp PC-5000 when we reviewed it last January.

Sharp washing machines for the home market are about half the size of those in the U.S.



Typical Japanese word processor has keyboard with 128 touch sensitive locations.



Panels slide into place over the keyboard for kana, kanji, and other characters.

SONY

Sony is a giant multi-national corporation with sales of $3.4 billion in 1983. Roughly two-thirds of its sales came from outside of Japan, with about 29 percent coming from the U.S. After tax earnings in 1983 were a disappointing $127 million, considerably less than the record $305 million in 1980.

Video products are Sony's largest product group, followed by television sets, audio, and "other," a catchall category that includes sporting goods, chemicals, batteries, measuring instruments, and computers. Sony's only computer, the SMC-70, and related peripherals account for considerably less than 5 percent of total sales.

Video Orientation

Although Sony's word processing system got the top rating among 39 systems in a recent Datapro user survey, this ranking has yet to be reflected in sales. Sony's MSX machines, the HitBit HB-55 and HB-75 just recently went on the market and have yet to make much of a contribution to sales (they probably won't be seen in the U.S. for about a year).

That leaves the 3.5" micro floppy disk drive, an important OEM product, and the SMC-70. The SMC-70 is a Z80A-based machine with outstanding graphics capabilities (similar to the Toshiba T-100; see *Creative Computing*, November 1983).

Wisely, Sony is not simply pitting the SMC-70 against every other 8-bit small business machine on the market, but is developing a series of sophisticated graphics add-ons. The first product is a superimposer that mixes two video signals, say from the computer and a VCR or laserdisc player.

In Tokyo, Akira Suzuki and Yataka Yamashiki showed us several new products in the prototype stage. One combines the video superimposer with a laserdisc controller. An early application of this device is a system for travel agents that allows clients to select a destination and see a video presentation about it tailored to their specific requirements.

Another device combines a CD (compact disk) player with a single frame memory (150,000 bytes), superimposer, and decoder. This allows a CD to store computer data, video signals, and, of course, high quality audio. Yamashiki showed us a spectacular demonstration that combined all three—unbelievable! A third system performs similar miracles with broadcast quality videotape, but its heady price will position it way outside of any mass market.

A fourth system uses a low-end version of the SMC-70 (sold only in Japan) and dramatically enhances the possible color gradations to the point where it is difficult to tell the difference between a computer-generated image and a video image.

With these systems, Sony is building upon their reputation as a supplier of high quality video and audio equipment. This is an interesting niche in the market and one that Sony is well qualified to exploit.

Sony SMC-70 coupled to videodisc superimpose unit is set up to give travelers a preview of various destinations.

Yutaka Yamashiki and Akira Suzuki of Sony showed us several amazing computer/video demonstrations and talked about future plans.

The U.S. Operation

Sony has been in the U.S. for nearly 25 years and has built up a strong sales organization, mostly of Americans. Nevertheless, they recognize that computers, particularly home units, must be sold differently than audio and video equipment. Thus, the "go slow" attitude toward an MSX computer.

Even so, we are now seeing the first computer/video systems on these shores, and they look exciting. Keep 'em coming, Sony.

SORD

Sord is a young company, not only in the age of the company (founded in April 1970) but in the age of the employees (average 26) and the president, Takayoshi Shiina, 42.

Sord claims to be the fastest growing industrial company in Japan. Its 1983 sales of $90 million represented a 40 percent increase over 1982; we estimate after tax profits to be a healthy 4.7 percent of sales.

Upon arriving at Sord's headquarters in downtown Tokyo, we were ushered into a conference room. A few minutes later, Shiina himself came bounding in, unaccompanied, and spent the next hour with us. By the time we left, we had not only an excellent, candid interview with Shiina on tape but had signed a contract for a Sord affiliate to represent *Creative Computing* in the sales of advertising in Japan.

This approach, practically unheard of in other Japanese companies, is characteristic of Sord and explains, to some extent, how they have achieved an important position in the worldwide computer market in just 14 years.

The history of Sord is described in the fascinating book, *The Flame From Japan,* by Takeo Miyauchi. We have space only for a few highlights here.

Right from his early days at Tokai University, Shiina was looking forward to going into business for himself, a fearful course for any young man in Japan. Said Shiina, "I knew then that if you don't own your own company, you can't really advance beyond a certain level even if you're the hardest worker in the world." Others in Japan may feel the same way, but only a handful ever muster the courage to do what Shiina did—invest his life savings of ¥650,000 ($1800) to form Sord, Inc. with his mother as his sole business partner.

Over the years, Shiina has attracted other young men of insight and ambition to Sord. Recognizing early that he could not do everything himself, Shiina went after the top talent for all key positions.

This approach has paid off handsomely. In 1980, Sord introduced a revolutionary language, PIPS, a no-programming systems of integrated software that allows users easily to tailor a computer system to meet their needs.

In addition to PIPS, Sord developed other innovative software products such as PCAD, a personal computer aided design system that brought CAD within the reach of a much broader range of companies than were able to afford larger CAD systems. Sord was also an early developer of a local area network system as well as several specialized systems for air traffic control, automobile production line control, video tape editing, and laboratory measurement and analysis.

For a company its size, Sord offers a wide range of products. At the bottom end is the M-5, a home computer with color animation, a powerful version of Basic, and a subset of PIPS for more serious applications. One step up is the innovative IS-11, a notebook portable with built-in integrated software (see *Creative Computing,* June 1984).

The M23 8-bit series of five desktop machines offers the full PIPS "no-programming" language, excellent graphics, and the ability to emulate an IBM 3270 terminal. The M243 series extends the capabilities of the M23 into a mutli-job, multi-language environment.

Takayoshi Shiina, president of Sord, conveyed infectious enthusiasm for his company.

The M243 Mark X is an 8-bit middle-of-the-line small business computer from Sord.

The M343 series utilizes a 16-bit 8086 mpu while the top-of-the-line M68 series utilizes the 32-bit 68000 mpu and UNOS, a Unix-like operating system.

In addition to these basic computers, Sord also makes a 68000-based desktop CAD system, dot matrix and daisywheel printers, 8-color plotter, and mag tape storage unit.

A monthly magazine, *Sord World,* keeps users around the world informed about new applications, software, and other developments.

Sord's U.S. operation is relatively small at present with just one office on each coast. However, Shina expects to open offices in Chicago and Texas by the end of the year. "Then we'll really be ready to go places in the U.S." Given the amazing progress of the company in Japan and Europe, we think that is a safe bet. Welcome to the U.S., Sord.

TOSHIBA

Toshiba is a diversified corporation with a broad range of industrial and consumer products. Although perhaps best known in the U.S. for audio/video products, Toshiba makes a full range of home appliances, electronic components, computers, medical equipment, heavy machinery, elevators, locomotives, power plants (hydroelectric, thermal, and nuclear), broadcast and telecommunications equipment, and airport facilities. On 1983 sales of $10.4 billion, the company earned $160 million, a meager 1.5% return.

Electronic components and industrial electronics, a category which includes computers, accounts for 33% of total corporate sales. With a 22% annual growth rate, this is the fastest growing sector of the company. We have no estimate of the computer sector alone.

Thirty percent of Toshiba's total sales come from outside of Japan, of which about one-half comes from the U.S. Typical of many Japanese companies, the president and treasurer of the U.S. computer division are Japanese, while most of the other key managers are American. The U.S. operation is expected to meet mutually agreed-upon goals, but is free to make decisions appropriate to the U.S. market.

In the opinion of Kimiyasu Kobayashi, senior manager of the information systems group, and Hidetaka Yamamoto, manager of personal computers in Japan, Toshiba has not yet achieved critical mass in the U.S., and, indeed, they are concerned with determining how to do so. We suggested that the company would benefit from wider distribution and better targeting of promotion; they agreed that these were weak spots.

Toshiba markets two MSX machines in Japan but has no immediate plans to export them to the U.S., at least not until more than just game software is available.

Indeed, Toshiba seems to be very sensitive to the issue of software and, for that reason alone, Yamamoto feels it is important to have IBM compatibility. The T-300 is about 80 percent compatible with the IBM PC, high enough to meet the needs of many users, but the U.S. sales people would like even greater compatibility.

We offered our opinion that the T-100 offers a great deal of capability per dollar (see *Creative Computing*, November 1983 and January 1984). The Toshiba people in Japan agreed but noted, with some distress, that the U.S. company felt that 8-bit machines were no longer viable.

Toshiba is taking a cautious approach to introducing new products in the U.S. Although they have been selling a Unix-like system, the UX-300, in Japan for the past two years, and it is technologically ready to launch, they are sensitive to the movements of Big Blue and want to wait to see what the rumored Unix offering of IBM looks like before releasing theirs. They also have a multi-cpu machine similar to one produced by Convergent Technologies, but again, are waiting to launch it.

Toshiba spends heavily on research and has just completed an ultra-modern 20,600 square meter VLSI research center. Also, it is one of the companies with people assigned to the Fifth Generation Project. While they don't see any immediate benefits on the horizon, they have great expectations and feel that the project is worthwhile because it distributes the cost of basic research.

Recently, foreign countries were invited to join in the Fifth Generation Project. Kobayashi found it curious that the U.K., France, and West Germany were eager to participate while the U.S. showed very little interest. 完

View of Shinbashi and Kachidoki areas and a portion of Tokyo harbor from the 23rd floor of the new Toshiba building.

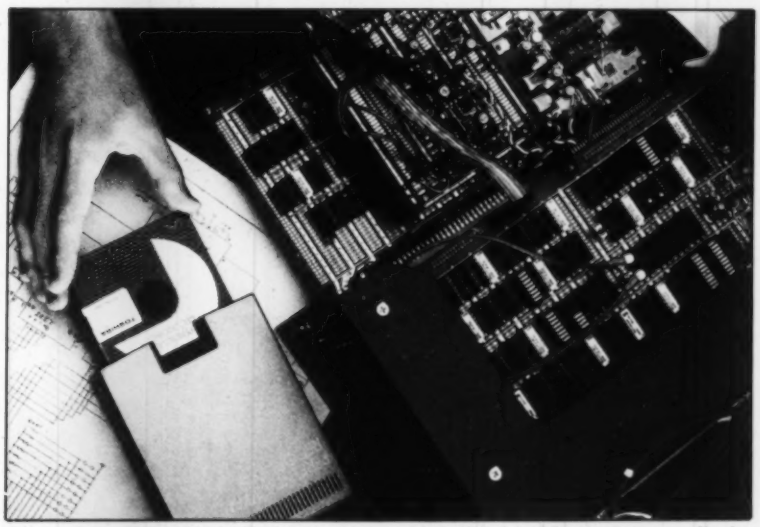


Photo shows the inside of Toshiba's new compact disk drive. It uses a perpendicular magnetic recording system for very high density storage.

Kay Nishi Bridges the Cultural Gap

Magazines to MSX

文化的ギャップを
またがける
西和彦氏

Betsy Staples

"If you want to succeed in personal computing, just drop out of college." Sometimes that seems to be the best advice for an aspiring entrepreneur in computerdom. Everyone knows about Steves Jobs and Wozniak of Apple, Bill Gates of Microsoft, and many others of lesser fame but comparable wealth.

And when you get right down to it, this familiar pattern is not really too surprising. It is quite in keeping with the entrepreneurial nature of our economy. But, as you now know from having read most of the articles in this issue, it would be very unusual in Japan, where most of a young person's energy is spent preparing for the entrance exam that will get him into the school that will, upon graduation, get him a job in the company that will offer him lifetime employment.

That is why Kay Nishi is worth writing about. As president of ASCII Microsoft, the division of the software giant that handles development of software for 8-bit machines, Mishi is one of the most powerful people in the industry. And how did he get that way? By dropping out of the prestigious Waseda University and getting involved with personal computers back when they were just game machines.

In late 1975, he and a friend designed a game using the GI chip. He then went to GI and attempted to buy some chips so he could begin to manufacture the game. "They said, 'you have to buy in large quantities.' I didn't have enough money to do that, so instead of selling a game, I decided to sell the information I had used in designing it.

"So I wrote a magazine article, and it went really well. Soon many publishers were asking me to write articles about video games.

If you want to succeed in personal computing, just drop out of college.

"Then I decided that instead of writing for other people, I would write a book and publish it. But I soon changed my mind again and decided to publish a magazine of games and other electronic products. That was my first magazine, *IO*, which is today primarily a hobby magazine."

Later, he started *ASCII* magazine, and "whenever I wrote about a product I felt I could have made it better. So I decided to try. But I didn't want to get into manufacturing, so I decided to try software design. But I needed an interpreter, and who had an interpreter? Microsoft.

"So at midnight one night in August of 1977 I picked up the phone and called Microsoft in Albuquerque, NM. 'May I talk to your president?' I asked. Bill Gates picked up the phone, and we started talking, and by the end of the conversation, I had offered to send him a ticket so he could come to Japan. He said he couldn't do that, so I went there.

"I said 'Let's sell software,' and after some more discussion we decided to work

together. By late 1978 we had a contract with NEC to design the hardware and software for the product that was to become the NEC PC-8000, the first microcomputer with Microsoft Basic. We launched a product, and since then everything has been phenomenal."

Thus began a frenetic existence divided almost equally between Tokyo and the West Coast of the United States. Nishi regularly jets across the Pacific, always travelling first class and frequently conducting business meetings in the air. On a recent trip to Hong Kong, for example, we met the president of an American computer company who was about to leave for Tokyo so he could catch a plane and meet with Nishi during the flight to Seattle. "I don't want to go to Seattle," he told us, "but it's the only way we can get together."

Basic Games for Japanese Computers

Somewhere between the birth of *IO* and the phone call to Gates, Nishi met Dave Ahl at an early computer fair. Nishi was familiar with the DEC version of *101 Basic Computer Games* and asked for permission to produce a Japanese version of the microcomputer edition. The two publishers struck an informal deal, and ASCII has been publishing the book and its sequel, *More Basic Games*, ever since.

"*Basic Computer Games* is my most favorite book," says Nishi. "It sustained *ASCII* magazine during the early years when it wasn't making very much money."

Those years are long gone, however. In 1982, the annual revenue of ASCII Microsoft was $20 million, about half of which came from software sales. The other half was attributable to book and magazine publishing, but the ratio is changing as software becomes more important to the company.

In 1982, the annual revenue of ASCII Microsoft was about $20 million.

MSX or Bust

Nishi's latest crusade is on behalf of MSX. He believes strongly in the new standard that has done so well in Japan and is spending much of his time in both Occident and Orient trying to convince others—software publishers, hardware manufacturers, and the press—that MSX is the wave of the future.

And if past performance is any indication, he will succeed. If there is an MSX machine in your future, it will probably be due to the efforts of the indefatigable Kay Nishi. 完

"Show me your ultimate design. We'll build it."

On a recent trip to Japan, at breakfast with Kay Nishi, he showed me some design sketches for the next generation of MSX machines. In a sense, they were a cross between an Apple IIc and a Pioneer MSX computer with a raft of additional features.

I mentioned that I had put together a wish list of features and design sketch for the ultimate notebook computer (*Creative Computing*, Jan. 1984). "Show it to me. We'll build it," said Nishi. He laughed when he saw the projected weight (1.2 lbs.) but much of the rest he seemed to think was within reason (high-resolution color display, 1Mb memory, dual processors, built-in modem and printer, and self-contained integrated software).

That kind of attitude is typical of Nishi. Other people have looked at our ultimate dream design and said, "Ridiculous. It's impossible." With Nishi, anything can be done, the impossible just takes a little longer.—DHA

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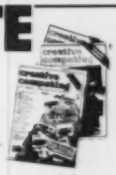

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MSX: A Standard for the World

MSX・世界のスタンダード

David H. Ahl

More than one-half of the consumer electronics products sold worldwide are made in Japan. Yet in the U.S., the Japanese do not have a single successful low-end computer. Why not?

If you listen to Microsoft—and 14 Japanese computer manufacturers did—the reason is lack of compatibility, especially in software. In early 1983, Microsoft (USA) and ASCII/Microsoft (Japan) took it upon themselves to develop a hardware/software standard that was suitable for low-end computers. In late May this was presented to a meeting of Japanese computer manufacturers.

The standard was adopted immediately by six manufacturers who announced MSX computers at the Japan Electronics Show in Osaka in October 1983. Six other manufacturers have subsequently jumped on the bandwagon. However, the top two manufacturers in small computers, NEC and Sharp, have declined to use MSX. This is understandable in view of the enormous commitment both companies have made to their existing line. For example, the NEC PC-6000 is supported by some 1300 peripherals and software packages.

Microsoft chose an opportune time to introduce the MSX standard as most Japanese manufacturers of consumer electronics products had experienced a decade of consumer irritation and resistance as a result of the lack of standards in other products. Within just the last few months, various industry associations sponsored standardization conferences for 8mm video, digital audio cassettes, and compact discs to prevent repeats of the VCR (Beta and VHS) and videodisc (optical, CED and VHD) situations. Thus, early standardization in computer hardware/software was welcomed by most manufacturers.

Another reason the standard was well received is that most Japanese hardware manufacturers have generally lagged in providing supportive software for their computers. Although third party software publishers have filled the gap in the U.S., there are far fewer similar companies in Japan. Furthermore, until the advent of MSX, no single computer had the popularity in Japan of an Apple, IBM PC, or Commodore 64 in the U.S., and software companies were unable to grow and sustain themselves writing for just one machine. Nor were any American companies attracted to write software for Japanese computers.

MSX Specifications

The basic MSX specifications are shown in the table. As should be apparent, this is not a high performance machine. Instead, it is a good, basic, capable computer suitable for games, some educational applications, and programming in Basic.

Indeed, most manufacturers are selling their early MSX entries primarily as video game machines with the added capability of Basic. Several manufacturers are offering interesting peripherals that remove their machines from the game category, at least by a small step. Sony and Victor have added video overlay capability (but have no supporting software yet); Yamaha has added keyboards and music synthesizers; Sanyo has added a light pen; Pioneer has added

CPU	8-bit Z80A (Zilog or equivalent)
ROM	32K (MSX Basic by Microsoft)
RAM	8K or more
Video Chip	TMS 9918A (TI or equivalent)
Text	32 characters x 24 lines
Graphics	256 x 192 pixels, 16 colors
Sound chip	AY-3-8910 (General Instruments or equivalent)
Sound	8 octaves, 3-tone chord
Peripheral Chip	i8255 (Intel or equivalent)
Printer Port	8-bit parallel interface
Keyboard	English alphabet, numerals, Hiragana and Katakana (Japanese syllabic "alphabets") and graphic symbols ready for future implementation.

Table 1. MSX Specifications.

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Atari 1050	$349
Rana 1000	Call

MEMORIES

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Mosaic 48K (400)	$98
Mosaic 64K (400/800)	Call
Mosaic 32K	$68
Atari 64K (600XL)	Call

INTERFACES

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Ape Face	Call
Atari 850 (In Stock)	$169
Interfast 1	$150
Microbits 1150	Call
Axiom Buffer	Call

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Axiom 550 AT	$319
Axiom 700 AT	$469
Atari 1025	$395

DIRECT MODEMS

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Cardco B	Call
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RANA

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Elite II Drive	$444
Elite III Drive	$549
Drive Controller	$89

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Gemini 15X	$378
Delta 10	$378
Star Letter Qual.	Call

EPSON

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MX100	Call
RX 80 F/T	Call

NEC

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3530	$1259
3550	$1598
7710/7730	$1719

CITOH

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Prowriter II	$648
Starwriter	$1098
Printmaster	$1448

OKIDATA

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84P	Call
92	Call
93	Call

MANNESMAN

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Spirit	Call

SMITH CORONA

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JUKI

	Call

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NEC

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PANASONIC

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NOVATION

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D-Cat	$149

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Ultima	$27
Zoom Graphics	$34

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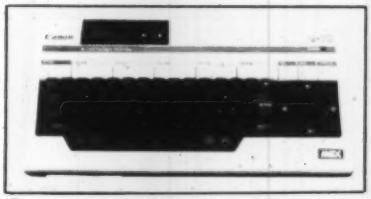
MSX Computers

Hitachi MB-H1.

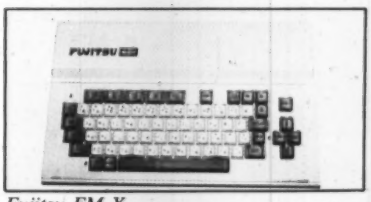
Sony HB-55.



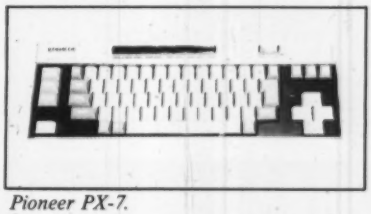
Canon V-10.

National CF2000.

Toshiba HX-10D.

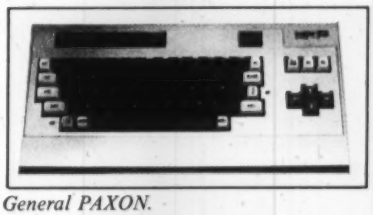


Fujitsu FM-X.



Pioneer PX-7.

Victor HC-6.



General PAXON.

Sanyo MPC-10.

Yamaha YIS-503.

	RAM	Cartridge Slots	Keyboard Type	Printer Interface	Price*	Comments
Canon V-10	16K	2	Full key	Yes	$244	
Fujitsu FM-X	16K	1	Full Key	No	221	
General PAXON	16K	1	Full Key	Yes	569	Includes RGB monitor
Hitachi MB-H1	32K	2	Full Key	Yes	279	
MB-H1E	32K	2	Full Key	Yes	244	
Mitsubishi ML-8000	32K	1	Full Key	Yes	266	
National CF-2000	16K	2	Full Key	No	244	
Pioneer PX-7	32K	1	Full Key	Yes	399	Mixes video. Works with laser disc
Sanyo MPC-10	32K	1	Full Key	Yes	332	Includes light pen
Sony HB-55	16K	1	Chiclet	Yes	244	Some built-in software
HP-75	64K	1	Full Key	Yes	292	
Toshiba HX-10S	16K	1	Full Key	No	244	Includes cables
HX-10D	64K	1	Full Key	No	292	Includes cables
Victor HC-6	32K	1	Full Key	Yes	288	Video mixer option
Yamaha YIS-303	16K	1	Chiclet	No	221	
CX-5	32K	1	Chiclet	Yes	266	Music keyboard option
YIS-503	32K	1	Full Key	Yes	288	Music keyboard option

*Yen converted at ¥225 per $1

Faceoff: Will MSX Be A Success in the United States?

MSXは米国で成功するか

Yes!

Howard Root

MSX was designed as a standard system to permit software from one computer to run on all of them. Thus, software manufacturers will be attracted to making software for it. They won't be casting their lot in with the success or failure of just one hardware maker.

Furthermore, since it is a cartridge-based system, software makers won't have to worry about piracy. Today, the minute a new package hits the market, it gets ripped off. Thus, software makers are deprived of a substantial portion of their revenue; this won't happen with MSX, so software producers will be doubly attracted to the system.

Because the hardware and software are standard, they will be more widely understood—if you learn MSX, you automatically can use 16 different machines. As a result, magazine and book publishers will want to publish material about MSX. Sure, the manuals with the systems may not be very good—they rarely are—but there will be loads of books and articles about the system. Already in Japan, there is an MSX magazine; certainly there will be at least one in the U.S. along with scores of books.

The Japanese manufacturers are much more conservative (read, profit-minded) than many U.S. manufacturers; thus they are not likely to enter into destructive price wars. As a result, this will create some stability in the low end of the market and customers can buy a system without having to worry whether the manufacturer is going to be around to provide continuing support.

Since many of the manufacturers of MSX systems make a full-line of audio, video, and other consumer electronics products, we can expect to see all kinds of interesting peripherals and add-ons for MSX computers. For example, Sanyo has a nifty light pen, Yamaha has a music keyboard, JVC has a video mixer for TV (or VCR) and computer signals, and several other interesting devices are planned. Indeed, Pioneer has a system that loads software from videodisc which interactively uses the videodisc and computer together. Thus, although an MSX computer is relatively inexpensive, it can have the capabilities of much more expensive systems.

In addition to these special-purpose add-ons, several manufacturers plan to offer inexpensive disk drives, modems and other peripherals, thus making MSX a full-function general-purpose computer.

Will MSX succeed in the U.S.? You bet! 完

No!

Brian Williams

MSX has as much going for it as the TI 99/4A, that is to say, practically nothing!

MSX is a cartridge-oriented system. That means it is more costly for third party manufacturers to produce software for it. Thus we won't see small, innovative manufacturers producing the wide range of software that is necessary to make a machine a success. Sure, the 13 or 14 Japanese manufacturers of MSX systems are all producing software but so far they have produced nothing but games. Moreover, even if they do decide to produce non-game software, it won't be geared to the American market.

Second, there is the hardware itself. Although MSX was designed to be standard on the inside, about the only thing that is standard on the outside are the software cartridge, printer, and joystick connectors. The machines use different peripheral connectors and cables, different cassette recorders, and different expansion interface connectors. That means if K-Mart stocks three or four MSX machines, they will have to stock different cables, cassette recorders, and interfaces for each one. Can you imagine your average K-Mart salesman trying to make sense out of all that?

In Japan, MSX computers are sold mostly through computer shops with reasonably knowledgeable salesmen; the U.S. system of distribution will defeat MSX in its tracks.

The games market is stagnant in the U.S. Atari and Coleco are sticking it out, but Mattel (Intellivision), N.A.P. Magnavox (Odyssey), and all the private label manufacturers have given up. Now, along comes MSX, a glorified game unit—who needs it?

You might say, "But MSX is a computer and runs a powerful version of Basic with all kinds of neat graphics and sound commands." That may be true, but users will not know how to use them. The translated Japanese manuals, if they follow the usual tradition, will be incomprehensible. We can't expect much from Microsoft either; just look at the rotten job they have done in producing a manual for MS Basic. Moreover, MSX was produced by ASCII Microsoft, a Japanese company, so we certainly can't expect anything from them.

Right now, every MSX manufacturer is waiting for one of the others to take the first step in the U.S. They all point to the recent price war in low-end computers and state that they don't want to jump into a volatile market. As a result, they will probably wait around for another year or so until MSX is technologically obsolete, kind of a repeat of the Timex/Sinclair situation in which they introduced the computers in the U.S. market a year after England, i.e., a year too late.

Will MSX succeed in the U.S. market? Not a chance. 完

Japanese Computer Manufacturers

Japanese Microcomputers Available in the U.S.

Canon

Canon X-07

The Canon X-07 is an exceptionally compact portable computer, weighing just over one pound. It has a 4-line by 20-character LCD display, with a CMOS Z80 CPU, 20K of ROM, and 8K of RAM, expandable to 24K. Small memory cards about the size of two stacked credit cards are available with both ROM for applications software packages and RAM for removable user memory. The keyboard is laid out in QWERTY fashion, but is 20% smaller than a standard keyboard and has calculator-style keys.

Canon AS-100

The Canon AS-100 is an intelligent business work station that can run both the MS-DOS and CP/M-86 operating systems. At the heart of this computer is a 4MHz 16-bit 8088 microprocessor. Starting at 64K of RAM, the AS-100 can be expanded to 512K with the insertion of memory cards.

The AS-100 supports double sided, double density floppy disk drives in both the 8" and 5¼" formats. Available with either green monochrome or full-color displays, the AS-100 boasts a 640 x 400 pixel resolution on a 12" screen.

Casio

Casio FP-200

The Casio FP-200 is primarily a spreadsheet portable and runs a built-in software package called CETL (Casio Easy Table Language). It is a *VisiCalc*-like language, and anyone familiar with another spreadsheet will be able to use it immediately. Much like the Canon X-07, it is built around a CMOS version of the Z80, with 8K of RAM. However, the FP-200 comes with 32K of ROM standard, and sports an 8-line by 20-character display. The keyboard is full-size, but uses calculator style short-travel keys. It is a good choice if you are looking for portable spreadsheet capabilities.

Epson

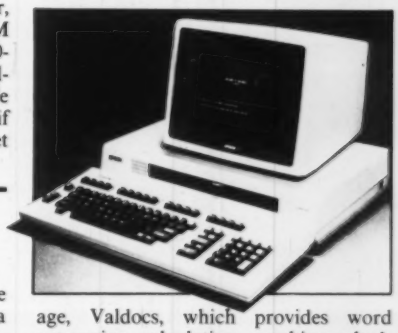
HX-20

The Epson HX-20 was the first true notebook-sized computer. It uses a CMOS version of an 8-bit Z80 microprocessor and comes with 16K RAM,

expandable to 32K, and 32K ROM, expandable to 64K. The HX-20 has a 4-line by 20-character LCD screen, a standard typewriter keyboard, and a built-in microcassette recorder and printer.

QX-10

The Epson QX-10 desktop computer uses an 8-bit Z80A microprocessor with 64K of memory, expandable to 256K. It comes with an integrated software pack-



age, Valdocs, which provides word processing, calculation, graphics, scheduling, filing, and electronic mail.

Fujitsu

Fujitsu 16s

The Fujitsu Micro 16s Personal Business Computer sports dual Z80 and 8086 processors, 128K of RAM, two double density, double sided 5¼" floppy disk drives, detachable keyboard, and CP/M-86. It can run all software designed for CP/M 2.2. Running optional Concurrent CP/M-86 allows the Micro 16s to perform up to four computing jobs simultaneously. With RAM expandable to 1 Mb, high-resolution RGB color, and 20 Mb Winchester drives available, the Fujitsu qualifies as a powerful turn-key business system.

Ricoh

Monroe System 2000

Ricoh, known for its printers, also manufactures a microcomputer for the Monroe label. The Monroe System 2000 uses a 16-bit 80186 microprocessor,

comes with the CP/M-86 DPX and MS-DOS operating systems, and includes 128K RAM, expandable to 896K. It has five expansion slots, one parallel port, and two serial ports.

NEC

Advanced Personal Computer

The APC uses a 16-bit 8086 microprocessor and includes 128K RAM, expandable to 640K. It has two built-in 8" floppy disk drives with 1Mb storage

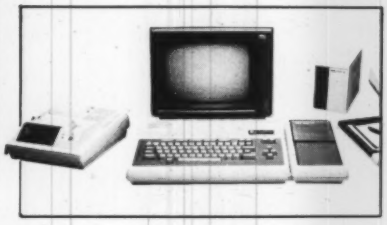
capacity each, a 109-key detachable keyboard, either a built-in monochrome or color monitor, a parallel port, and an RS-232C serial port.

APC III

The recently introduced NEC APC III business personal computer is supplied with 128K of RAM, which may be expanded to a maximum of 640K of memory. Structured around a true 16-bit 8086 microprocessor, the base NEC APC III system runs at 8MHz. Standard ports include both serial and parallel interfaces, in addition to video output jacks for television or monitor viewing of the 640 x 400 pixel resolution display. The single 5¼" floppy disk drive system runs both MS-DOS and Unix, and on-line storage capacity may be increased with the addition of an additional drive and an external 10 Mb hard disk.

PC-6000

The NEC PC-6000, known as the NEC Trek, is an inexpensive home computer that hooks up to a television or monitor. It uses an an 8-bit NEC μPD780C-1 microprocessor and contains 16K RAM and 16K ROM, both expandable to 32K with cartridges. A



built-in synthesizer provides eight octaves of sound. Optional disk drives and data cassette recorders are available.

PC-8200

The NEC PC-8200 notebook computer comes with 16K of RAM and 32K of ROM, both expandable to 64K. An optional external cartridge adds 32K RAM. The PC-8200 features a type-

writer-style keyboard and an LCD screen display of 8 lines of 40 characters. Business software is included. An optional plug-in thermal printer and data cassette recorder are available.

PC-8800

The NEC PC-8800 desktop computer uses a Z80 compatible microprocessor and comes with 128K of memory. Four internal slots accommodate 128K mem-

ory expansion boards. The PC-8800 supports monochrome and color monitors and external double sided, double density 5¼" or 8" floppy disk drives. *WordStar, MailMerge,* and *Multiplan* software packages are included.

Panasonic

Panasonic Sr. Partner

The Panasonic Sr. Partner is a portable computer powered by a 16-bit 8088 microprocessor with an MS-DOS 2.11 operating system. Starting with 128K of RAM, the Sr. Partner can be expanded to 512K of memory. A half-height double sided, double density 5¼" floppy disk drive provides 360K of on-line storage, and an additional drive may be added. In addition to the built-in 8½"

thermal printer, both serial and parallel devices can be connected via RS-232C and Centronics ports. The 9″ high-resolution green monitor displays 80 characters x 25 lines, and an external RGB or composite video monitor can be hooked up if desired. Included free with the system are popular software packages including *Lotus 1-2-3, dBaseII* and Microsoft's *Flight Simulator.*

Sanyo

MBC 550/555

The Sanyo MBC 550 and 555 desktop computers use a 16-bit 8088 microprocessor and come with 128K of memory, expandable to 256K. The MBC 550 has one double sided, double density floppy disk drive. The MBC 555 two. Both accommodate optional 10 Mb hard disk drives. The MBC 550 comes with *EasyWriter, WordStar,* and *CalcStar.* The MBC 555 also includes *SpellStar, MailMerge,* and the *InfoStar* database package.

MBC 1100/1150

The Sanyo MBC 1100 and 1150 use an 8-bit Z80A microprocessor and come with 64K RAM. Memory is not expandable. Tha Sanyo MBC 1100 contains one 5¼″ double sided, double density floppy disk drives; the MBC 1150, two. A optional 10 Mb hard disk is available. Both machines come bundled with *WordStar, SpellStar, MailMerge, CalcStar,* and the *InfoStar* database software package.

MBC 1200/1250

The Sanyo MBC 1200 and MBC 1250 are similar to the MBC 1100 and the MBC 1150, but use two Z80A microprocessors and add graphics capability up to 640 by 400 pixel resolution.

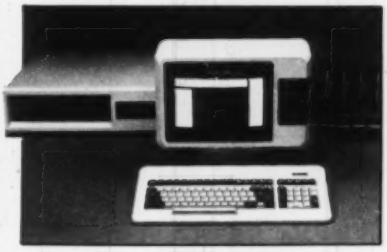
MBC 4000/4050

The Sanyo MBC 4000 and 4050 use a 16-bit 8086 microprocessor and come with 128K of memory, expandable to 512K. The MBC 4000 comes with one double sided, double density disk drive; the MBC 4050 with two. The MBC 4000 and 4050 are bundled with *WordStar, SpellStar, MailMerge, CalcStar,* and *InfoStar.*

Seiko

8600 XP

The 8600 XP includes a 16-bit 8086 microprocessor, 256K RAM, a 12″ green monochrome monitor, one 640K floppy disk, and one 10 Mb hard disk.



Seiko bundles word processing, spelling checker, mailing list, and communications software with the 8600 XP.

8600 MP

The 8600 MP is the same as the 8600 XP, but includes a 20 Mb hard disk and general ledger, accounts receivable, and accounts payable software.

Sharp

PC-5000

The Sharp PC-5000, one of the largest of the notebook computers, uses a 16-bit 8088 microprocessor and comes with 128K of memory, expandable to 256K. Optional 128K bubble memory cartridges, cassette recorder, and disk drives are available for mass storage. The LCD screen displays eight lines of 80 characters or graphics in a 80 by 640 pixel field. A full-size, typewriter-style keyboard is standard, and an optional 80-column, 37 cps thermal printer mounts right on the computer. *SuperWriter, SuperCalc 2* and *SuperComm* software is included.

Sony

SMC-70

The Sony SMC-70 uses an 8-bit Z80A microprocessor and comes with 64K of RAM, 32K of video RAM, and 32K of ROM. An optional external supercharger adds a 16-bit 8086 microprocessor and up to 768K of RAM. Mass storage is provided by 3½″ floppy disk drives or Corvus Winchester hard disk drives.

Sord

IS-11 Consultant

The Sord IS-11 uses an 8-bit Z80A microprocessor and has 32K of RAM, expandable to 64K, and 64K of ROM. An integrated software package, includ-

ing spreadsheet, word processing, calculator, and communications modules is installed in ROM. The IS-11 contains a built-in high speed microcassette recorder. The full typewriter-style keyboard comes in English, French, German, and Japanese versions, and the LCD screen displays eight lines of 40 characters or graphics in a 64 by 256 pixel field. An optional thermal printer and numeric keypad are available.

M23P

The Sord M23P desktop computer uses an 8-bit Z80A microprocessor and comes with 128K of memory and two 3½" microfloppy disk drives. It supports graphics on a monochrome or color monitor. The PIPS integrated software package, including spreadsheet, word processing, graphics, and communications programs, is bundled with the M23P. The M23P package includes the main unit, a green screen monitor, the PIPS integrated software package, and Basic II.

M68

The Sord M68 is one of the first commercial microcomputers to use the new 256K dynamic RAM chips. It contains a 16/32-bit 68000 and an 8-bit Z80A microprocessor, comes with 256K, expandable to 1 Mb, and holds up to three, plug-in 1 Mb memory boards. Mass storage is provided by two 1.2 Mb 5¼" floppy disk drives.

Mitsubishi

Sperry Personal Computer

Mitsubishi microcomputers are sold under the Sperry label. The Sperry Personal Computer is an IBM PC-compatible using a 16-bit, 8088 microprocessor. It runs under MS-DOS and comes with 128K RAM, expandable to 640K. With a flick of a switch, it operates at the same 4.77 MHz the IBM PC does, or at a faster 7.16 MHz clock speed. It has five expansion slots and includes a clock/calendar and serial port.

Toshiba

T300

The Toshiba T300 desktop computer uses a 16-bit 8088 microprocessor, comes with 192K, expandable to 512K, and one or two 5¼" quad density floppy disk drives, each with 640K capacity. 完

Japanese Manufacturers

(With products marketed in the U.S.)

Amdek Corp
2201 Lively Blvd.
Elk Grove Village, IL 60007
(312) 364-1180
Monitors, drives, plotters.

Axiom Corp. (division of Seikosha)
1014 Griswold Ave.
San Fernando, CA 91340
(213) 365-9521
Printers (some OEM).

BMC U.S.A., Inc.
16830 South Avalon Blvd.
Carson, CA 90746
(213) 515-6005
Personal computers, monitors and printers (some OEM).

Brother International Corp.
8 Corporate Pl.
Piscataway, NJ 08854
(201) 981-0300
Printers.

C. Itoh Electronics
5301 Beethoven St.
Los Angeles, CA 90066
(213) 306-6700
Terminals and printers (mostly OEM).

Canon U.S.A., Inc.
One Canon Plaza
Lake Success, NY 11042
(516) 488-6700
Personal computer, portable computers, printers, drives.

Casio Inc.
15 Gardner Rd.
Fairfield, NJ 07006
(201) 575-7400
Personal computer, pocket computers.

Epson America
23530 Hawthorne Blvd.
Torrance, CA 90505
(213) 539-9140
Personal and portable computers, printers (some OEM).

Fujitsu America, Inc.
3075 Oakland Village Dr.
Santa Clara, CA 95051
(408) 988-8100
Personal computer, disk drives, printers, modems, monitors.

Hitachi Sales Corp. of America
401 W. Artesia Blvd.
Compton, CA 90220
(213) 537-8383
Large computers, terminals, displays, disk drives, printers (mostly OEM).

Juki Industries of America
20437 S. Western Ave.
Torrance, CA 90501
(213) 320-9001
Printers.

Kyocera International, Inc.
7 Powder Horn Dr. P.O. Box 4227
Warren, NJ 07060
(201) 560-0060
Portable computers (Tandy, Olivetti). (all OEM).

Maxell Corp. of America
60 Oxford Dr.
Moonachie, NJ 07074
(201) 440-8020
Disks.

Mitsuba Corp.
667 Brea Canyon, #25
Walnut, CA 91789
(714) 594-6959
Disk drives, printers (mostly OEM).

Mitsubishi Electronics America, Inc.
991 Knox St.
Torrance, CA 90502
(213) 515-3993
Personal computer (Sperry), disk drives, monitors, printers (all OEM).

NEC Home Electronics U.S.A., Inc.
1401 W. Estes Ave.
Elk Grove Village, IL 60007
(312) 228-5900
Personal computers, monitors.

NEC Information Systems, Inc.
1414 Massachusetts Ave.
Boxborough, MA 01719
(617) 264-8000
Personal computers, printers.

Okidata Corp.
111 Gaither Dr.
Mt. Laurel, NJ 08054
(609) 235-2600
Printers.

Panasonic Inc. (division of Matsushita Electric)
One Panasonic Way
Secaucus, NJ 07094
(201) 348-5200
Personal computer, portable computer, printers, monitors, terminals, plotters, optical disk drives. (some OEM).

Quasar Co. (division of Matsushita Electric)
9401 W. Grand Ave.
Franklin Park, IL 60131
(312) 451-1200
Handheld computers.

Ricoh of America
20 Gloria Lane
Fairfield, NJ 07006
(201) 575-9550
Personal computer (Monroe), printers, disk drives. (mostly OEM).

Roland DG
7200 Dominion Circle
Los Angeles, CA 90040
Plotters, monitors, musical instruments.

Sakata USA Corp.
651 Bonnie Lane
Elk Grove Village, IL 60007
(312) 593-3211
Monitors.

Sanyo Business Systems Corp.
51 Joseph St.
Moonachie, NJ 07074
(201) 440-9300
Personal computers, monitors.

Seiko Inc.
1623 Buckeye Dr.
Milpitas, CA 95035
(408) 943-9100
Business computer.

Sharp International Corp.
60 W. 45th St.
New York, NY 10036
(212) 840-0960
Portable computer, pocket computers.

Silver-Reed America, Inc.
19600 S. Vermont Ave.
Torrance, CA 90502
(213) 516-7008
Printers.

Sony Corporation of America
Sony Dr.
Park Ridge, NJ 07656
(201) 930-1000
Personal computer, monitors, projection systems, microfloppy disk drive system (some OEM).

Sord Computer of America
645 Fifth Ave.
New York, NY 10036
(212) 878-4403
Personal and portable computers.

Star Micronics, Inc.
200 Park Ave.
New York, NY 10166
(212) 986-6770
Printers.

Sumicom, Inc.
17862 E. 17th St.
Tustin, CA 92680
(714) 730-6061
Personal computer, OEM disk drives.

Taxan Corp.
18005 Cortney Court
City of Industry, CA 91748
(818) 810-1291
Monitors.

TDK Electronics Corp.
12 Harbor Park Dr.
Port Washington, NY 11050
(516) 625-0100
Diskettes.

Teac Corporation of America
7733 Telegraph Rd.
Montebello, CA 90274
(213) 726-0303
Disk drives (mostly OEM).

Toshiba America, Inc.
82 Totowa Rd.
Wayne, NJ 07470
(201) 628-8000
Personal computer, printers.

Transtar—Vivitar Computer Products, Inc.
2100 116th Ave. N.E.
P.O. Box C-96975
Bellevue, WA 98009
(206) 454-9250
Printers.

TTX Communications Corp.
3420 East Third Ave.
Foster City, CA 94404
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Apple Mechanic	20.95
Broderbund	
Bank Street Writer	49.95
Bank Street Speller	49.95
MicroPro	
Wordstar with applicard	346.50
Microsoft	
Multiplan (Apple DOS)	136.50
T.A.S.C. (Applesoft Compiler)	136.95
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Sensible Speller	87.50
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Mitsubishi TV Printer

New from Mitsubishi Electric

三菱カラーテレビ

David H. Ahl

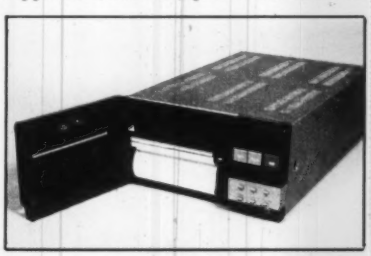
Most major hotels prepare a booklet, weekly or monthly, for their guests. It describes the facilities; lists hours, phone numbers, and scheduled entertainment; and may carry ads from the hotel shops. Booklets in Japanese hotels also have several quasi-commercial pages which describe scenic attractions, and the accomplishments of companies in the area.

Thus, it was from the booklet in the Palace Hotel in Tokyo that I learned of the Mitsubishi screen printer. The information was sketchy at best, so when I visited Mitsubishi to inquire about their computer operations, I asked to see the marketing manager for the screen printer.

Frankly, I was so impressed with the device that I bought one on the spot. Well, not quite; I had to return the next day—on my way to the airport—to pick it up. In Seattle, the customs inspector didn't quite know what to make of it since nothing on the box or unit was in English. He finally classified it as TV equipment and charged me 4.2 percent duty.

What is a Screen Printer?

A screen printer is simply a device that accepts a composite video signal, massages it a bit, and prints it. The concept is nothing new. There are boards for the Apple and other computers that take the



contents of the video memory of the computer and put it in a form suitable for a dot matrix printer. In contrast, the VP-51 from Seikosha is a self-contained device that takes any NTSC composite video signal and prints it onto 5" wide thermal paper.

What are the advantages and disadvantages to each of these approaches? Pros of a plug-in board are that it works with any dot matrix printer; the image can be scaled, rotated, reversed, stretched in one or both directions; and it may have a print buffer. Cons are that it is very time-consuming to do a dense print; the image must be still when it is being transferred into the memory on the board; and boards are available for only a few computers. Also, the process of transforming colored areas to black and white is not particularly good.

Pros of a screen printer such as the Seikosha VP-51 is that it can be used with practically any computer. The image can be normal or reversed and single or double size, and print time is relatively fast (less than 15 seconds). Cons are that there is no shading (a color either prints black or not at all); the image must be still during the entire print process; and the resolution is relatively low.

Okay, what about the SCT-P50; how does it stack up? Like the Seikosha, it can be used with any computer, the image can be normal or reversed, and the print time is 15 seconds. Like the plug-in boards, it has a memory buffer; in addition, it has a frame grabber that will grab and freeze a moving image. Resolution is a medium-high 280 x 234 pixels with an image size of 100 x 84mm (approx. 3.9" x 3.3"). Moreover, it has 16 gray levels so black and white or color images are accurate.

Disadvantages of the SCT-P50 are that it can't shrink or enlarge an image. The image size is smallish, and it isn't available in the U.S. Indeed, the only English sentence in the instruction booklet reads, "This printer is designed for use in Japan only and cannot be used in any other country."

The SCT-P50

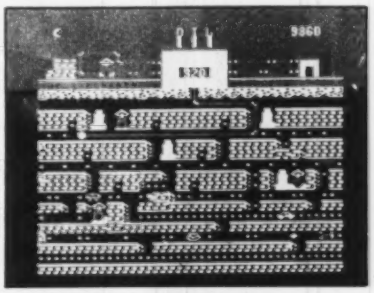
The unit is promoted as a TV printer. Indeed, the promotional literature shows a young lady wrapped in a long printout of scenes from a James Bond movie. Nevertheless, the instruction booklet includes diagrams for hooking it up to a VCR, video camera, and personal computer.

The device is available in two configurations: built into a console containing a TV set and VCR, or as a stand alone unit. The console sells for $1147, and the SCT-P50 alone for $310.

A door on the front opens for paper loading. The unit accepts rolls of 4 1/2" wide white thermal paper. Each 25m roll will produce 220 images and costs about $3.55.

Nine touch button controls are on the right of the front panel. They include power, print image, repeat print of last image, three controls for intensity (light to dark), paper feed, reverse image, and print direction (top to bottom or bottom to top). Also included is a remote control print image button on a 20-foot cord.

We found that for normal images, light or medium intensity produced the best images, while for reversed images, dark intensity was most satisfactory. Although intended for use with Japanese NTSC signals (very close to the U.S. standard) and for 100 volts, the printer worked fine



with no modifications at all.

Inadvertently, we gave it a tough test of operational ruggedness. A visiting child was using the computer to which the screen printer was connected and decided to push the paper back into the unit. After pressing the print image button four or five times, she finally decided it wasn't working. Needless, to say, the paper had wound around the roller causing a horrible jam. Moreover, the roller gears permit it to be rotated in one direction only and that was the "wrong" way for removing the jammed up paper.

So I removed some screws, cut the paper off the roller with an Exacto knife, reassembled the unit, and prayed. After an anxious moment when I pressed the button and nothing happened, I realized I had forgotten to reset the paper feed latch; once this was done, the unit worked fine.

All in all, the SCT-P50 Screen Printer from Mitsubishi Electric is a fine unit. Operation is silent, image quality is good, and the frame grabber capability is a real plus. And at $300 or so, the price is right. Now all we have to do is wait for Mitsubishi to bring it over. 完

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News and Views

David H. Ahl

Microcomputer Qualification Test

July 24, 1983 was an important day for the nearly 8000 people in Japan who took the first Microcomputer User Qualification Test. This test, administered by the Japan Microcomputer Club, was given simultaneously at 14 locations throughout the country.

Examinees ranged from 8 to 75 years old. The youngest to pass was an 11-year-old boy, and the eldest was 75. The majority of test takers and those who passed were in their 20's and 30's. Just over 58 percent of those who took the test passed. Several companies encouraged their employees to take the test, and one, Nippon Univac Kaisha, gave bonuses to those who passed.

Shigeru Watanabe, president of the Japan Microcomputer Club, spoke of the test: "Microcomputer users must possess both fundamental knowledge and application skills to make full use of those computers. Instead of professional specialists for mainframe computers, microcomputer users have to do everything for themselves: system and program design, coding and debugging, and determining what jobs should be computerized."

Mitsuo Takahashi, director of the Club added, "We think it is necessary for the Japanese people to have a greater understanding of microcomputers in order that they can enjoy the benefits of using these machines." He observed that most managers in Japan, typically middle-aged men, are very reluctant to use microcomputers. While they are widely used for routine jobs—order entry, general ledger, and payroll—they are not as effectively used for report writing and data analysis as they are in the U.S. Takahashi felt that this must change and that the qualification test was a step in the right direction.

U.S. To Collect High Tech Japanese Periodicals

A U.S. Commerce Department agency has set up a full-scale effort to collect Japanese technological information for U.S. manufacturers.

The National Technological Information Service (NTIS) has signed a contract with Mitsubishi Research Institute to obtain Japanese industry-published technical periodicals, Mitsubishi officials said. NTIS had earlier turned to the Japanese Government for help in gathering information from government run research organizations, but the approach apparently failed.

So far, more than 50 Japanese high tech firms have agreed to provide NTIS with their information periodicals. Among them are steel, electronics, biotechnology, and chemical companies. NTIS is reportedly seeking information from more than 500 firms in total.

Set up after World War II to facilitate the transfer of military technology to private industry, the agency has built up a large computerized database with more than two million pieces of technical information. —(*The Daily Yomiuri*, April 3, 1984)

Signs of the Times

I flew home from Japan on the William Patterson, a 747 outfitted for United's "Royal Pacific Service." Royal, my eye! The movie didn't work, but they still charged three bucks for a headset saying that you could watch it in the rear (smoking) section. The stewardess told me that I could not use my NEC 8201 on the flight. I put up a fuss and told her she ought to check with the captain (United has permitted computers since January). She huffed off and came back—much later—with the latest regulations in hand which spelled out, in black and white, that computers could be used aboard.

Fashions in Eating

To my right was a 72-year-old Japanese gentleman. He ate his meal with a knife and fork, quite ably, although in the

The serenity of swans just yards away from a busy boulevard is typical of the dual outlook of Japan—patient yet energetic.

European style. He told me, in halting English, that he had been practicing for months with a knife and fork so he would not embarrass any of his relatives in America or other Americans with whom he might come in contact. Can you imagine an American doing likewise?

In the row ahead, two Americans, who obviously had spent much time in Japan, chose to eat their meal with chopsticks rather than silverware. In contrast, two other Americans tried out their chopsticks and threw them down in awkward disgust. All too typical.

Minutes later, across the aisle, as a young Japanese man confidently picked up his fork, I thought to myself, "Here he is, a gentleman of the world." But then he proceeded to hold his dish an inch from his mouth, Japanese style. My image dissolved in a flash.

You might ask, "Well, smart aleck, what do you do?" My philosophy on manners is simple: "When in Rome..."

Sources of Information

While many general magazines and newspapers carry articles on Japan, we have consistently found informative articles in *The Wall Street Journal, The New York Times,* and *Fortune*. For more specific information, trade and professional magazines are useful, particularly those from the ACM.

For specific information on values, management, and high technology in Japan, we recommend:

Pacific Basin Quarterly. (Each issue runs about 14-pages with six or seven thoughtful articles or interviews.) Pacific Basin Center Foundation, P.O. Box 51523, Palo Alto, CA 94303. ($20 for 2 years)

Dempa Digest. (12-page weekly newsletter with 50 or so short news items about the electronics industry.) Dempa Publications, 400 Madison Ave., New York, NY 10017. ($250 per year)

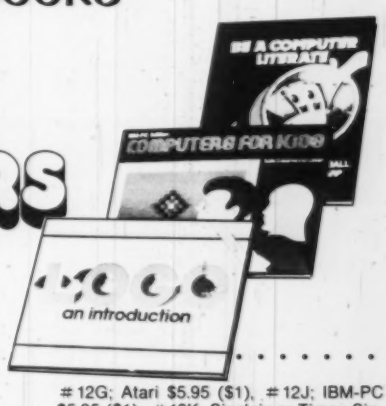
Japan High Tech Review. (16-page monthly newsletter with 20 or so short items, some reprinted from Japanese publications.) The Mead Group, P.O. Box 44952, Phoenix, AZ 85064. ($295 per year)

Computer Magazine, March 1984. (Much of the issue dealt with Japanese computer technology and culture with emphasis on the Fifth Generation Project, supercomputers, and robotics.) IEEE Computer Society, 10662 Los Vaqueros Circle, Los Alamitos, CA 90720.

Economic & Industrial Trends in Japan. (Monthly newsletter containing mostly statistics, financial indicators, and short articles interpreting the statistics.) Research & Planning Dept., The Industrial Bank of Japan, Ltd., 245 Park Ave., New York, NY 10167. (Free to qualified recipients)

Look Japan. (Monthly 28-page newspaper with articles and shorts about technology, industry, economics, culture, everyday life, international relations, and the Japanese perspective.) Look Japan, 2, 2-chome, Kanda Ogawa-machi, Chiyoda-ku, Tokyo, Japan ($50 per year) 完

COMPUTER BOOKS FOR YOUNG READERS



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Views of Japan by Three Authors

三氏による日本観

George A. Miller

Three recent books discuss the "miracle" of Japan, pulling itself together after the war, and building a nation greater than the U.S. There is considerable debate as to whether Japan is a greater nation than the United States, but there is little disagreement that Japan has become a major economic force in a very short time. The three books discuss how Japan did it, and what lessons there are for the United States.

Japan as Number 1: Lessons for America, by Ezra F. Vogel. Harper & Row, New York. 272 pages, paperback $6.95. 1979.

Japan as Number 1 by Ezra F. Vogel. Ezra F. Vogel is an unabashed Japanophile. His book, *Japan as Number I, Lessons for America* was published originally by Harvard University Press in 1979. Vogel has lived several years in Japan and written several books on the subject. *Japan as Number 1* was more popular in Japan than here in the United States. As if to rectify the situation he is currently writing a book called *Japan's Wasted Workers*, which should show the other side of the story. In *Japan as Number 1*, he is full of praise for the organization of the Japanese government. He believes that the government is responsible for the amazing success of Japanese business and sees lessons for the United States. Vogel avoids being preachy, since he realizes that the United States could probably never attain the level of bureaucracy nourished in Japan. The book is full of boring statistics and concentrates on government and politics.

The Art of Japanese Management, by Richard Pascale and Anthony Athos. Warner Books, New York. 363 pages, paperback $3.95. 1981.

The Art of Japanese Management by Richard Tanner Pascale and Anthony G. Athos. Pascale and Athos are business school professors from Stanford and Harvard respectively. Their book, published in 1982 by Warner Books, is a classical Harvard Business School case study of two companies: Matsushita and ITT. The authors rely heavily on the current theory taught in B-schools these days, and their book comes across as a consultant's report on what's wrong with America today. There is heavy emphasis on the "soft" side of business such as anthropology, religion, and philosophy. There are many messages to be learned, but at times the book becomes overbearing and preachy.

The Amazing Race: Winning the Technorivalry with Japan, by William H. Davidson. John Wiley & Sons, Inc., New York. 284 pages, $17.95. 1983.

The Amazing Race by William H. Davidson. William H. Davidson is another Harvard Ph.D. who teaches at the University of Virginia. His book should be of most interest to the readers of *Creative Computing* since he discusses the Japan vs. U.S. race from a technological standpoint. His book, *The Amazing Race*, (could this be a pun?) was published in 1984 by John Wiley & Sons. It is short (240 pages) and quickly read. He presents the facts in rapid fire fashion and draws logical conclusions avoiding blame and speculation.

To be fair, Davidson's book was written several years after the big Japan-is-going-to-win scare promulgated in part by the first two books in this review. *The Amazing Race* concentrates on recent computer hardware and software development of both countries. He explains that the U.S. is trying to stay in the number one position in both the standard of living race and the arms race. Our efforts are split by competition from Japan (little military) and USSR (low standard of living).

A Closer Look

All three books recount the steady, calculated buildup of the mighty Japanese economic engine. The Japanese government carefully studied successful industrial governments and took the best of all they surveyed to mold their own governments. Similarly, Japanese businessmen looked to the United States for help in improving their productivity. They so successfully copied our methods that when American businessmen look to Japan as a model for improvement, they often see old-fashion American methods. In fact, this notion of a mirror is reflected in the titles of the first chapters—The Japanese Mirror and A Mirror for America—of two of the books.

It is not surprising that some of the more successful U.S. companies are going to Japan and copying some of the corporate values. One of the first to do this was IBM. In 1939 Thomas Watson Sr. travelled to Japan and met with the great Konosuke Matsushita. He brought back with him many of the management techniques Matsushita was using to build his billion dollar trading company.

More recently, Steven Jobs of Apple Computer visited Japan and used many of the automated factory ideas he saw in building the Macintosh factory in Fremont, CA. It is easy for new ideas to flow quickly from country to country. Pascale calls for more in his book when he pleads, "But technology, technique, and innovative ways of *thinking* move across national boundaries more readily than ways of perceiving, believing, and behaving. We face a tough task in changing how we manage because we are a large part of the problem. We must change who we *are*, as well as what we do."

Ezra Vogel tells of the close cooperation of the Japanese government and business. The ministries are quick to share with business information that they have gathered at great expense. However, sometimes the private companies outshine the Japanese government, especially in areas where they have a substantial economic interest: "In 1973 the American government was shocked to learn that Soviet officials in the United States had arranged with an American company for a large sale of wheat to the Soviet Union, but a Japanese trading company was not surprised. Officials in the Moscow office of the trading company had wired the Tokyo office that several high trade officials who would make such agreements were suddenly absent from the Moscow scene. Upon request from the Tokyo office, company employees stationed in New York found that these officials were going through a New York airport en route to Colorado, and regional trading company officals were able to confirm that they were meeting with the American company. It was not difficult to surmise what the meeting was about. The purpose of the Japanese company's research was to make some adjustments to the grain market before information about the purchase became public and caused a rise in the price of grain."

Vogel offers the Japanese view of the U.S. political system: "The Japanese believe that the American system—wherein individual contributors pressure individual politicians to their own ends, and some groups are better organized than others—leads to haphazard results that do not necessarily reflect the major interests of the largest number. They perceive America as making political decisions that are inadequately considered, subject to idiosyncrasies, and lacking in constancy and breadth of vision."

All this is quite possibly true; however, I as a reader could not grasp what the author was calling for other than a revision of the U.S. political system. I don't feel that any one system is better than all others. I think that the system must mold itself to the culture and personality of the nation. Even though we sweep the bureaucrats out every four or eight years, we still manage to have vision enough to put a man on the moon. Our leading world position in computers was not a result of studied proclamation of the government, but of companies left to their own devices.

Davidson points out that the United States government has stood staunchly in support of free trade, whereas the Japanese government has a lopsided view of free trade—that is, free export and restricted import. Furthermore, the establishment of NASA by the U.S. government was not for economic purposes, but for the lofty goal of achieving and maintaining a position of world leadership in technology, science, and military endeavors. Davidson concludes that it is important from a military standpoint for the U.S. government to encourage, economically, a strong ally such as Japan in the Asian basin. This strategy benefits the U.S. military and the U.S. consumer. It is generally bad for U.S. industry and the unemployed workers hurt by the flood of cheap Japanese goods.

The Art of Japanese Management is devoted entirely to an explanation of why the Japanese culture produces organizations that are far better than U.S. organizations in promoting the four "soft" S's. The Seven S's are:

Strategy: Plan or course of action

Structure: Characterization of the organization chart

Systems: Procedures, etc.

Staff: Personnel

Style: How key managers behave in achieving goals

Skills: Capabilities of key personnel

Superordinate Goals: Guiding concepts of the organization

The last four S's are the soft ones. The whole book is built around these factors and a comparison of the successes of Japanese and U.S. corporations with these factors. This is just the kind of gruel that bores a computer nerd like me.

Vogel in *Japan as Number 1* concentrates on the successes Japan has had in industry, politics, basic education, welfare, and crime control. The point of his book is not to offer a balanced comparison of the Japanese vs. the U.S. but rather a detailed look at their successes and what lessons we may learn from them. Japan, of course, has had notable failures, but Vogel's book doesn't mention them since he is dwelling only on the successes.

It is hard to keep this in mind when you read his book. You get the feeling that you are getting a one-sided, biased discussion of Japan, and you are. Our culture encourages competition, so, when any red-blooded American reads this book, he will read it as competition instead of just a look at Japan's success.

Japanese traditionally don't share the competitiveness of Americans. Take a stroll in any Japanese park on a warm spring day and you will see hundreds of people hitting a shuttlecock back and forth. They are not playing a game. They are not keeping score. They are just having fun. I was somewhat shocked when I first was asked to play tennis in Japan. We warmed up for an inordinate amount of time. When I suggested that we start, I was told that the "game" was over and it was time for the next set of players to take to the court. Frankly, I like competition, and that is perhaps why I liked Davidson's book best.

The Amazing Race was published this year. Even so, the computer industry is changing so fast, that the book is out-of-date. Davidson states: "The low end of the personal computer market, in the $400-and-below segment, is dominated by Atari, Commodore, Texas Instruments, and Sinclair." Of course, the last two have dropped out of the U.S. market. However, most of what Davidson says is current and crucial to an understanding of who is going to win the computer race.

Like any good sports commentator, Davidson gives the background story on each contestant: Japan's industrial strategy and economic system, and those of the U.S. move into a post-industrial society in the 60's and 70's. He then lays out the rules for the contest and the prize for the winner: world domination of information technology. With charts and diagrams he skillfully illustrates the current position of each contestant in the race. Finally, Davidson has the courage to prognosticate the winner. I won't give away the exciting conclusion, but encourage all who are interested in this race to read *The Amazing Race*. 完

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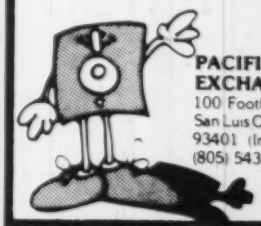

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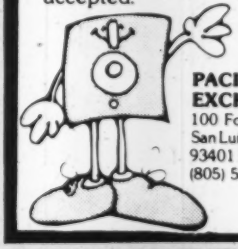

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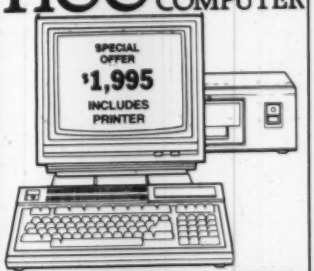

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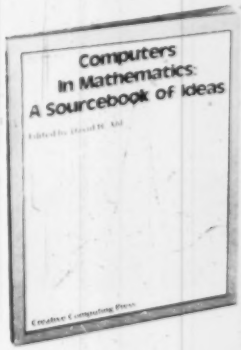

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Coming Attractions

September

The special 16-page "Choosing and Using" section in September will be devoted to database management packages. We have gotten practically every database package on the market and put them through their paces over the past few months; we report our results to you in September.

Also in that issue, we report on a wide variety of entertainment software, not just games, but fascinating ideas which challenge your intellect and your imagination.

Also, upgrading your IBM PC; reviews of the Sanyo, Monroe, and Stearns computers; our regular columns; and much more.

October

Integrated software packages is the subject of our 16-page special section. Not only do we tell you what to look for in an integrated package, but we rate all the available packages on how well they perform all of their promised functions. A little preview: the differences are staggering—and some just don't measure up.

Also in October, we take an in-depth look at educational software for both school and home. New products, objective reviews, thoughtful articles, and regular columns round out the issue.

November

You have been waiting for this for ten years: the incredible tenth anniversary issue of *Creative Computing*. Here is the history and future of personal computing told by the people who made history and who will make the future. An all-star cast of 50 movers and shakers tells you the story from the inside. People like Scott Adams, Rodnay Zaks, Adam Osborne, Peter McWilliams, Carl Helmers, Don Estridge, George Morrow, Clive Sinclair, Seymour Papert, Gordon Bell, John Kemeny, Bill Godbout, and 38 others.

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